SEPTEMBER 5, 1931

Railway Age

FOUNDED IN 1856

In This Issue

Reducing Expenses at the Engine House

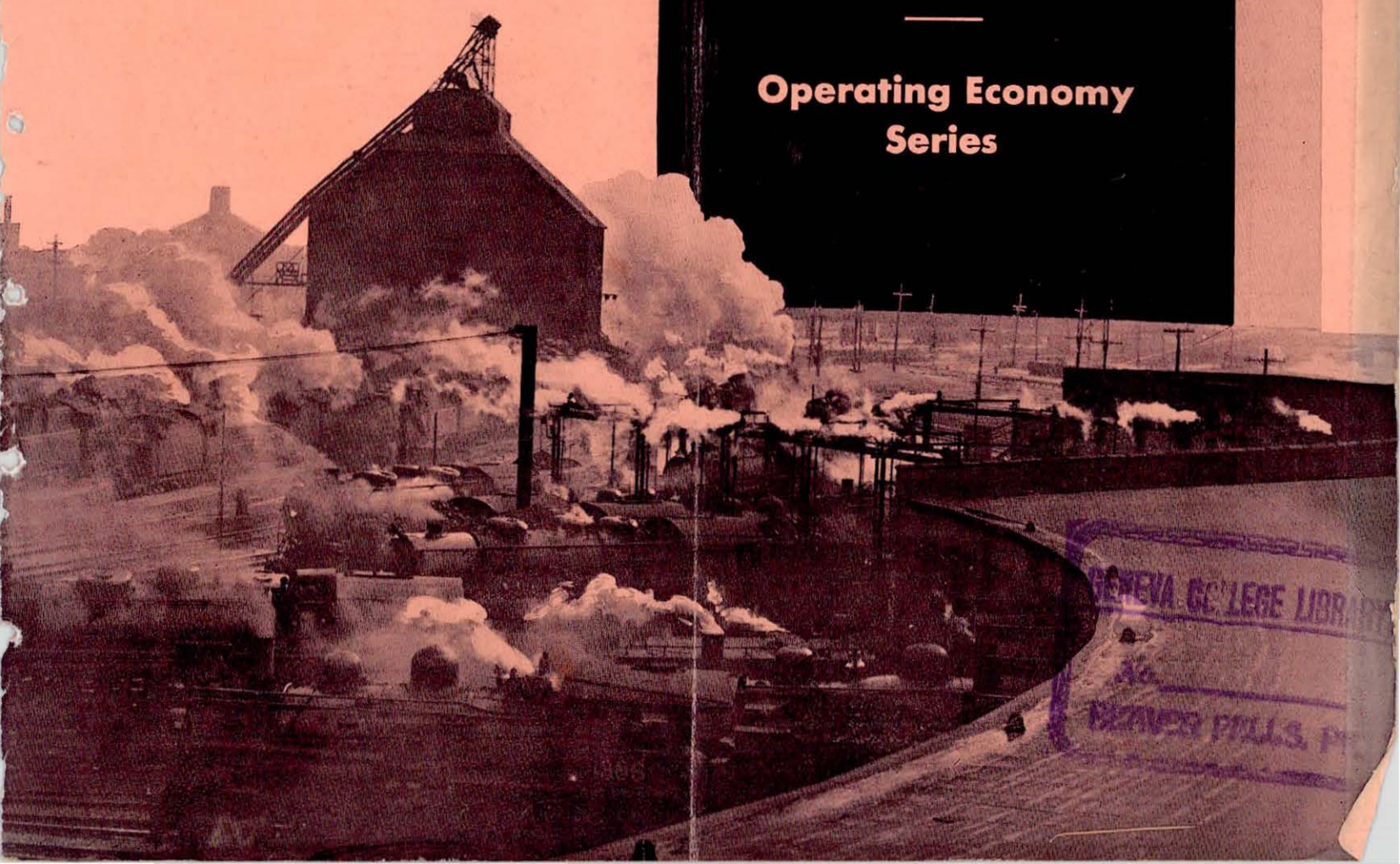
Article No. 9

Operating Economy Series

Next Week

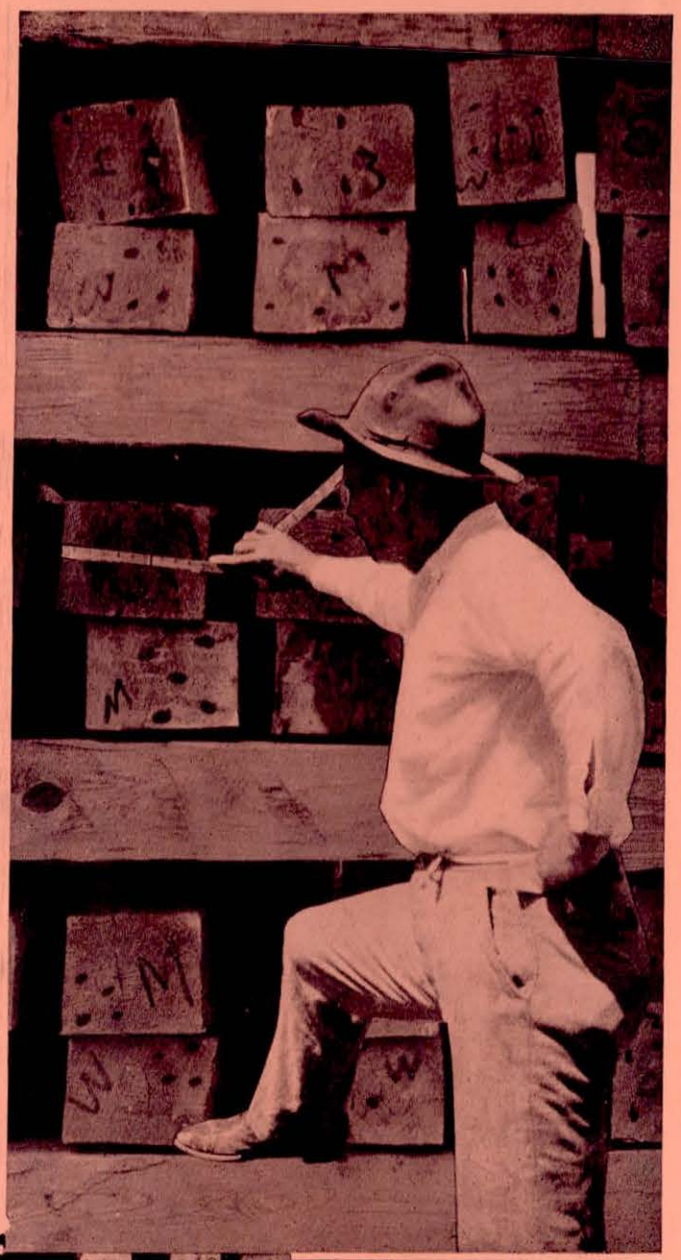
Article No. 10

"Centralized Traffic Control Reduces Operating Costs"



GENEVA GE LEGE LIBR
MINERS MILLS, P

INSPECTION
That Adds Years To Tie Life



International's rigid inspections result in uniformly high quality ties and assure to the purchaser maximum value for every dollar expended for ties.

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PRODUCERS OF HIGH GRADE TREATED TIES

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This dating nail is your assurance that the tie is a Standard A.R.E.A. Specification Tie.

Full Size
Sound Timber
Properly Seasoned
Scientifically Treated

Alphabetical Index to Advertisers—Page 52 Buyers Directory of Advertisers—Page 45

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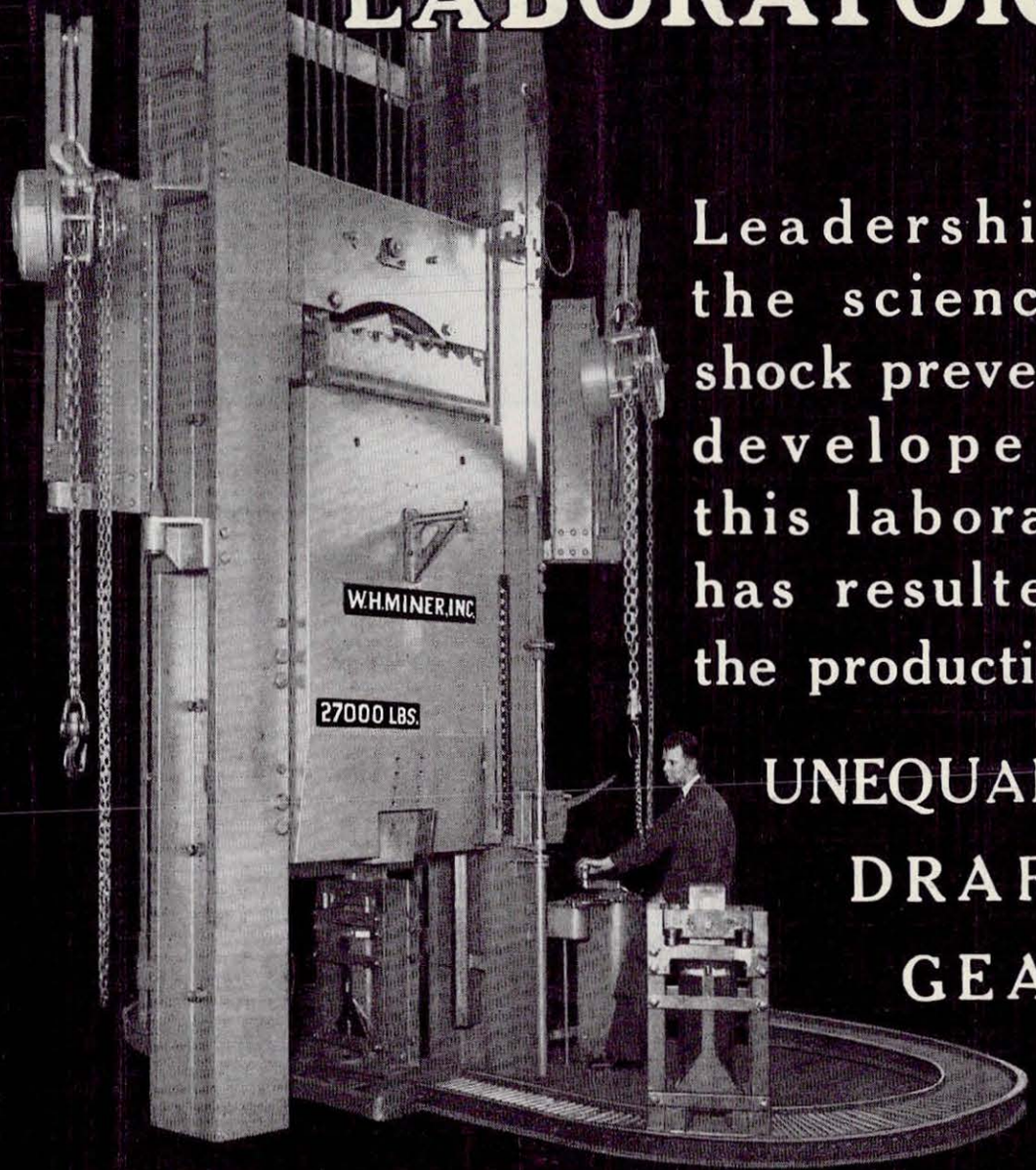
MINER

RESEARCH LABORATORY



Leadership in the science of shock prevention developed in this laboratory has resulted in the production of

UNEQUALLED DRAFT GEARS

W. H. MINER, INC. CHICAGO

Railroading Costs

Big loads—high speeds. The giant steam locomotive of today pulls a mile of freight cars at passenger-car speeds. A bigger job for lubrication, with the great variety of modern railroad equipment—electric and Diesel electric locomotives, rail motor cars, motor coaches, shop and power house equipment. Highest grade oils and engineering service are needed as never before.

Operating economies—how to get them. A bigger problem today than ever in railroad history.

Can railroad officials expect to cut their operating costs by a careful study and improvement of lubrication practice in every department?

You may believe that your lubrication practice *is* already efficient—that you *have* cut operating costs. So have other roads—and manufacturers throughout industry—who later have made even *greater* economies through the use of Gargoyle lubricants and Vacuum engineering service. They have cut costs for repairs and maintenance, saved power and reduced bearing failures.

GARGOYLE

Railroad Lubricants

Today, railroad executives should consider this fact carefully — further operating economies can be made and *Correct Lubrication* can help make them.

VACUUM OIL COMPANY, INC.

Railroad Department • 61 Broadway, New York City. Branches and warehouses throughout the world

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With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name Registered U. S. Patent Office

Vol. 91 September 5, 1931 No. 10

In This Issue

Reducing Expenses at the Enginehouse ..... Page 350

Operating Economy Series, Article No. 9, which points out that changes in operating conditions affecting locomotive utilization and maintenance afford real opportunities to save money by modernizing engine-terminal facilities.

How Increase Coal Tonnage? 357

High pressure gas is not a menace, but high pressure gas salesmanship demands similar aggressiveness on the part of the coal industry and the coal-carrying railroads, according to C. V. Beck, president, St. Louis Coal Company.

Hidden Costs of Company Material 367

C. I. Cavenaugh, division storekeeper, Atlantic Coast Line, discusses opportunities for economies in the reduction of surplus stocks, excessive handling, etc.

EDITORIALS

Business Men and Government in Business 347
Prosperity By Taxation 349

GENERAL ARTICLES

Reducing Expenses at the Enginehouse 350
Southwestern Lines File Store-Door Tariff 353
Speeding Up Trains With Water Cars 354
Reading Testimony on Traffic and Purchases 356
How Increase Coal Tonnage? By C. V. Beck 357
Receivers for F. E. C. 358
Oklahoma City Opens New Station 359
Western Rate Hearings Conclude Testimony 363
Pacific Electric Sponsors Education Among Employees 365
Hidden Costs of Company Material, by C. I. Cavenaugh 367
Texrope V-Belt Axle-Generator Drive 369
Lift Trucks for Tight Places 370
Substituting Motor Coaches for Trains 371
Freight Car Loading 373

ODDS AND ENDS 374

NEWS 375

The Railway Age is indexed by the Industrial Arts Index and also by the Engineering Index Service

. . . WHERE RED SIGNALS SAFETY . . .

THE engineer or maintenance man recognizes as a signal of safety the pure red-lead paint coating which covers every joint and surface of the iron and steel structures in his charge.

Dutch Boy Red-Lead safeguards iron and steel against the destructive forces which, if left unchecked, turn valuable metal structures into mountains of rust. Dutch Boy Red-Lead seals out corrosion . . . seals out rust . . . seals out the moisture and gases that are constantly attacking exposed metal.

Dutch Boy Red-Lead is a fine, highly oxidized pigment supplied in two forms —paste and liquid. The paste comes in natural orange-red, is readily mixed to brushing consistency and can be tinted to darker colors.

Dutch Boy Liquid Red-Lead (ready for the brush) is available in orange-red, two shades each of brown and green, and also in black. For assistance in your metal painting problems, write to our Department of Technical Paint Service. Address nearest branch.

NATIONAL LEAD COMPANY

New York, 111 Broadway—Buffalo, 116 Oak St.—Chicago, 900 West 18th St.—Cincinnati, 659 Freeman Avenue—Cleveland, 820 West Superior Avenue—St. Louis, 722 Chestnut St.—San Francisco, 2240 24th St.—Boston, National-Boston Lead Co., 800 Albany St.—Pittsburgh, National Lead & Oil Co. of Pa., 316 Fourth Avenue—Philadelphia, John T. Lewis & Bros. Co., Widener Bldg.

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IMMUNITIES are special—not universal. There is a solvent for gold. Platinum succumbs to the attack of certain chemical reagents. The remarkable properties of U S S Stainless and Heat Resisting Alloy Steels vary as the proportions of chromium or of chromium and nickel are increased or diminished. From almost endless formulae with which experiments were made, a few were adopted because they proved satisfactory under typical conditions of use. Additional alloying elements are added when necessary or advisable.

These steels are recommended with discrimination. There is one best adapted to each particular requirement. Correspondence is invited by the Subsidiary Companies of the United States Steel Corporation whose names appear below:

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¶ **AUTOMOTIVE and AERONAUTIC**—For radiator shells, hub caps, lamps, bumpers, moldings, polished parts and fittings, hardware and trim, airplane parts and instruments.

¶ **MANUFACTURING and INDUSTRIAL**—Machinery and furnace parts, dampers, fans, preheaters, pumps, conveyors, turbine blades, nozzles, plungers, and machinery specialties.

¶ **CHEMICAL**—Vats, tanks, stills, digesters, condensers, retorts, paper and pulp manufacturing equipment, circulation systems, and laboratory apparatus.

¶ **OIL REFINING**—Bubble caps, still tubes, linings, heat exchangers, ducts, containers, tanks, agitators, and other refining equipment.

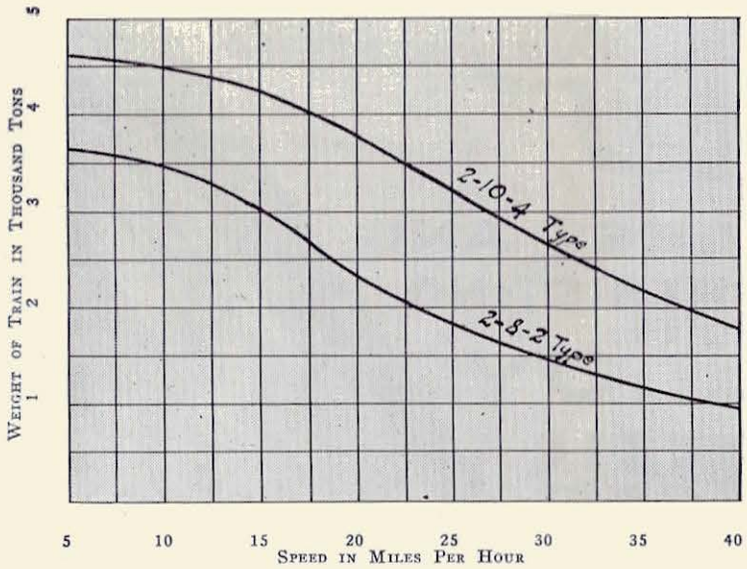
¶ **FOOD HANDLING**—Pasteurizers, tables, hospital and hotel kitchen equipment, restaurant fixtures, cafeteria trays, food preserving and dairy machinery and accessories, ice cream and milk containers and utensils.

¶ **ARCHITECTURAL**—Structural members and supports, hinges and hardware, decorative metal embellishments, flat surface facings, moldings, doors, grilles, panels, and ornamental work.

¶ **HOME APPLIANCES**—Kitchen equipment, cooking and canning utensils, furniture, cabinets, electrical appliances, sinks, plumbing fittings, stoves, ranges, and tableware.

¶ **MISCELLANEOUS**—Packing house equipment, soda fountain counters and fixtures, display cases, laundry machinery, tank cars, fittings, and similar uses.

Speed *and* Tonnage



THE rated tractive force of a locomotive determines the weight of the train that it can start, but **boiler horsepower determines the speed that can be maintained after the train is moving.** Hence to get Speed and Tonnage combined, ample boiler power is a first essential.

The above diagram shows the hauling capacities of typical 2-8-2 and 2-10-4 type locomotives on a grade of 0.5 per cent, at various speeds. The 2-8-2, with approximately 60,000 pounds rated tractive force and 2,450 boiler horsepower, represents the best practice of ten years ago; while the corresponding figures for the 2-10-4, which is an up-to-date design with plenty of boiler power, are 77,200 and 4,374 respectively. Note that—

At 5 miles per hour, the 2- 8-2 will haul 3650 tons
At 5 miles per hour, the 2-10-4 will haul 4625 tons } Increase 975 tons

At 25 miles per hour, the 2- 8-2 will haul 1825 tons
At 25 miles per hour, the 2-10-4 will haul 3200 tons } Increase 1375 tons

The greater tractive force of the 2-10-4 pulls 26.7 per cent more tonnage at 5 miles per hour, while the bigger boiler pulls 75% more at 25 miles per hour.

In handling a specified tonnage over a 94-mile division, with ruling grades of 0.5 per cent, these two locomotives compare as follows:

Type	Number of Locomotives required	Train movement per month in each direction	Annual cost of operation	Cost Per 1000 G.T.M.	Operating Saving First Year
2- 8-2	20	308	$633,917	52.3c	
2-10-4	12	184	431,606	35.6c	$202,311

It takes Modern Locomotives to make money these days!

THE BALDWIN LOCOMOTIVE WORKS 1831 1931

THE
BALDWIN
LOCOMOTIVE WORKS
PHILADELPHIA

80%
OF POWER COST SAVED IN ONE RAILROAD SHOP

—*by Individual Motor Drive*

METAL WORKING TOOLS, as they are known today, began to take form in 1800, and by 1840 lathes, planers, milling machines, shapers and hammers were in use. But it was not until the development of the alternating current system by George Westinghouse in 1885 that the use of electricity in railroad shops truly came into being.

THE TRANSFORMER and the induction motor made possible the use of individual motor drive.

IN ALMOST HALF A CENTURY since that time the railroads, always alert to economies, have extensively adopted individual motor drive. As a result, by the elimination of line shafts, shop illumination has been improved, safety factors are higher, production has been increased and power costs have been substantially decreased.

MANY POSSIBILITIES for economies still remain, however, as shown by a recent inventory conducted by a leading trade journal. According to this survey approximately 67,000 metal working tools in railroad shops are still driven from line shafts.

BUT WHY TALK in generalities. Consider two concrete examples:

NUMBER ONE. A 22-stall roundhouse with a machine shop of 11 tools all driven from a line shaft connected to a 30-hp. motor. Monthly power bill was $237. Individual motors applied to each machine, *and costing $1250,* showed an annual power saving of $2280.

NUMBER TWO. A locomotive class repair shop containing 114 metal and woodworking tools driven from line shafts. Purchased power cost $1738 monthly. All tools equipped with individual motors, *at a cost of $15,000,* showed an annual power saving of $4,164.

IN ADDITION to the power saving in these two cases other important advantages were: better illumination; safety factor improved; efficiency of machines increased due to better speed control.

WESTINGHOUSE OFFERS a two-fold service. First, the services of specially trained representatives to discuss the latest developments in electrical apparatus for specific new tools. Second, the services of representatives who are competent to make engineering studies of existing line-shaft-driven shops to show what economies may be effected by the substitution of individual motor drive.

CALL THE WESTINGHOUSE OFFICE near you for friendly cooperation in studying possible economies in your shop.

Service, prompt and efficient, by a coast-to-coast chain of well-equipped shops

Westinghouse

WESTINGHOUSE ELECTRIC

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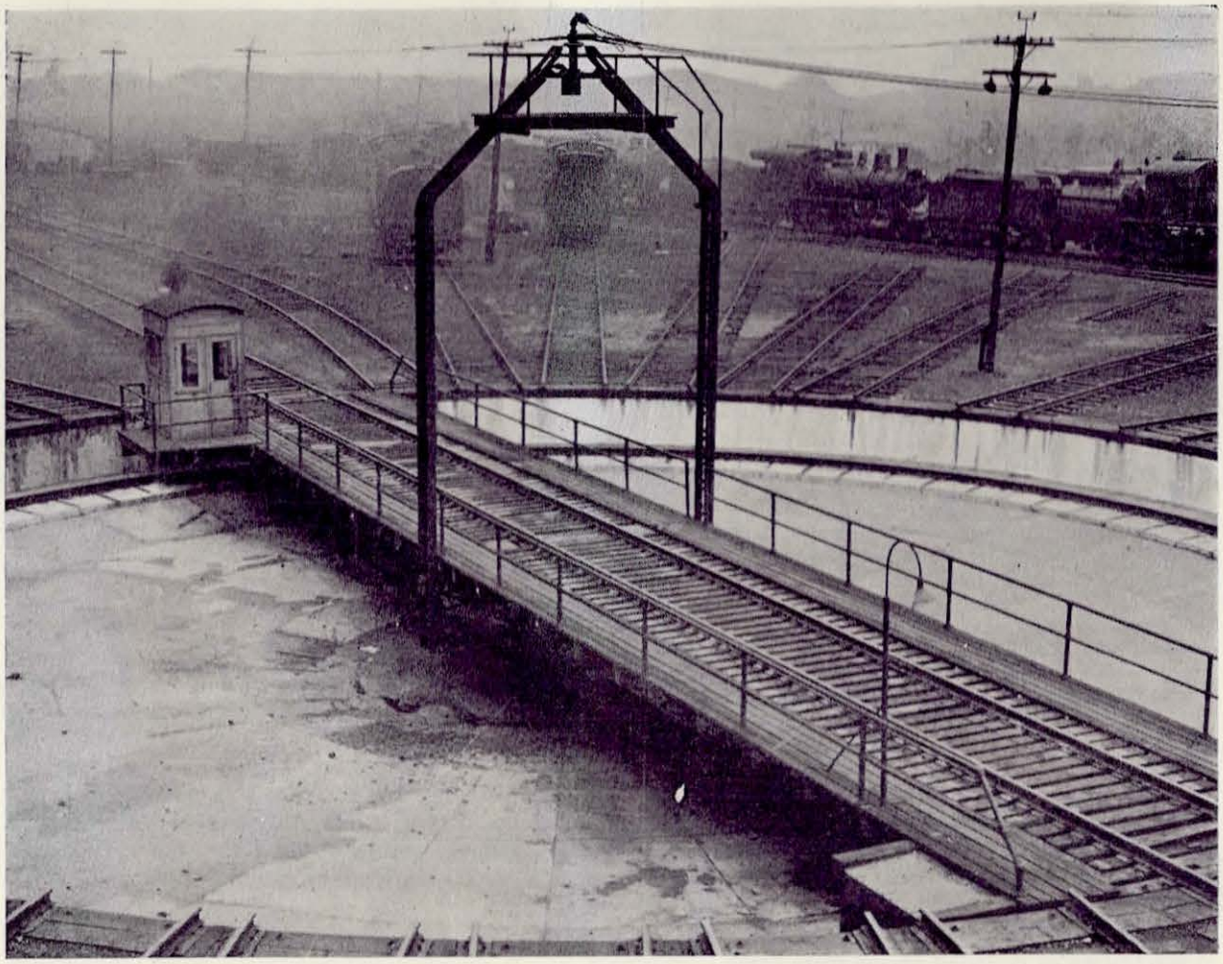

You can eliminate SPOTTING,

turn larger locomotives, and turn them more quickly—when you use a Bethlehem Twin-Span, Non-Balanced Turntable.

McCLINTIC-MARSHALL CORPORATION, General Offices, Bethlehem, Pa.

Subsidiary of
Bethlehem BETHLEHEM STEEL *Steel Corporation*

District Offices: New York, Boston, Philadelphia, Baltimore, Pittsburgh, Buffalo, Cleveland, Cincinnati, Detroit, Chicago, St. Louis, San Francisco, Los Angeles

Export Distributor: Bethlehem Steel Export Corporation, 25 Broadway, New York City

BETHLEHEM
TWIN-SPAN, NON-BALANCED
TURNTABLE

"What else can we do to *Reduce Accounting Costs?*"

Perhaps you are still asking this question despite the fact that you have materially cut accounting costs. It may seem as if no further economies in this direction are possible, yet there is another factor worthy of your consideration.

We suggest that you study, as never before, the new developments that have taken place in the business machine equipment field . . . developments that not only effect decided economies, but also provide greater speed, ease of operation and accuracy in the handling of all kinds of records.

Outstanding among these new developments are, for example, the following for freight accounting work:

A new Burroughs machine for preparing agents' abstracts and station register in one operation—

A new Burroughs tabulating and statistical machine for compiling freight statistics and auditing agents' accounts—

A new Burroughs for writing abstracts and division sheets of inter-line waybills—

A new Burroughs for establishing inter-line road control figures.

There have also been recent improvements in other Burroughs machines, providing new possibilities of further economies on many routine adding, bookkeeping and calculating jobs in railway accounting.

Many roads find that these new machines not only materially reduce the cost of accounting, but also that purchasing these machines outright enables a road to transfer this lesser charge from operating expense to capital expenditure.

Investigate. The experience and facilities of the Burroughs Railroad Accounting Division are at your command. Call the local Burroughs office, or write direct to Burroughs Railroad Accounting Division in Detroit.

BURROUGHS ADDING MACHINE COMPANY, DETROIT, MICH.
(*Railroad Accounting Division*)

Burroughs

A Few of the Newer Developments in Machines for Railroad Accounting

BURROUGHS STATION ABSTRACT AND REGISTER MACHINE

BURROUGHS COMMODITY STATISTICS MACHINE

BURROUGHS TYPEWRITER ABSTRACT MACHINE

BURROUGHS ROAD CONTROL MACHINE

One Man in Forty—

and YOU *are the Man*

DID you ever stop to think that *you* are one of the comparatively small percentage of men whose "yes" or "no" really matters to American business?

Every morning 40,000,000 men start to work—in factories and mines, banks, railways, stores and other centers of industry or trade. Forty million men turn the wheels that keep America clothed, sheltered and fed.

But only one million of them make business decisions. Only one man in forty has the ability, the responsibility or the authority to say yes or no in business matters. Hence the *real* managing power of the country lies in the hands of these million men—less than one per cent of its total population.

As a member of this group—this controlling minority—you share an important responsibility—the triple responsibility of wisely liberal purchasing, of generous employment and of sane management to hasten the return of general prosperity.

• • •

How, you ask, do we know that *you* are one of the million who make decisions for others to follow? Because men who read business papers are alert and eager for news of new plans, new methods, new equipment. That is *why* they are the men who control affairs

THIS SYMBOL *identifies an ABP paper . . . It stands for honest, known, paid circulation; straightforward business methods, and editorial standards that assure reader interest . . . These are the factors that make a valuable advertising medium.*

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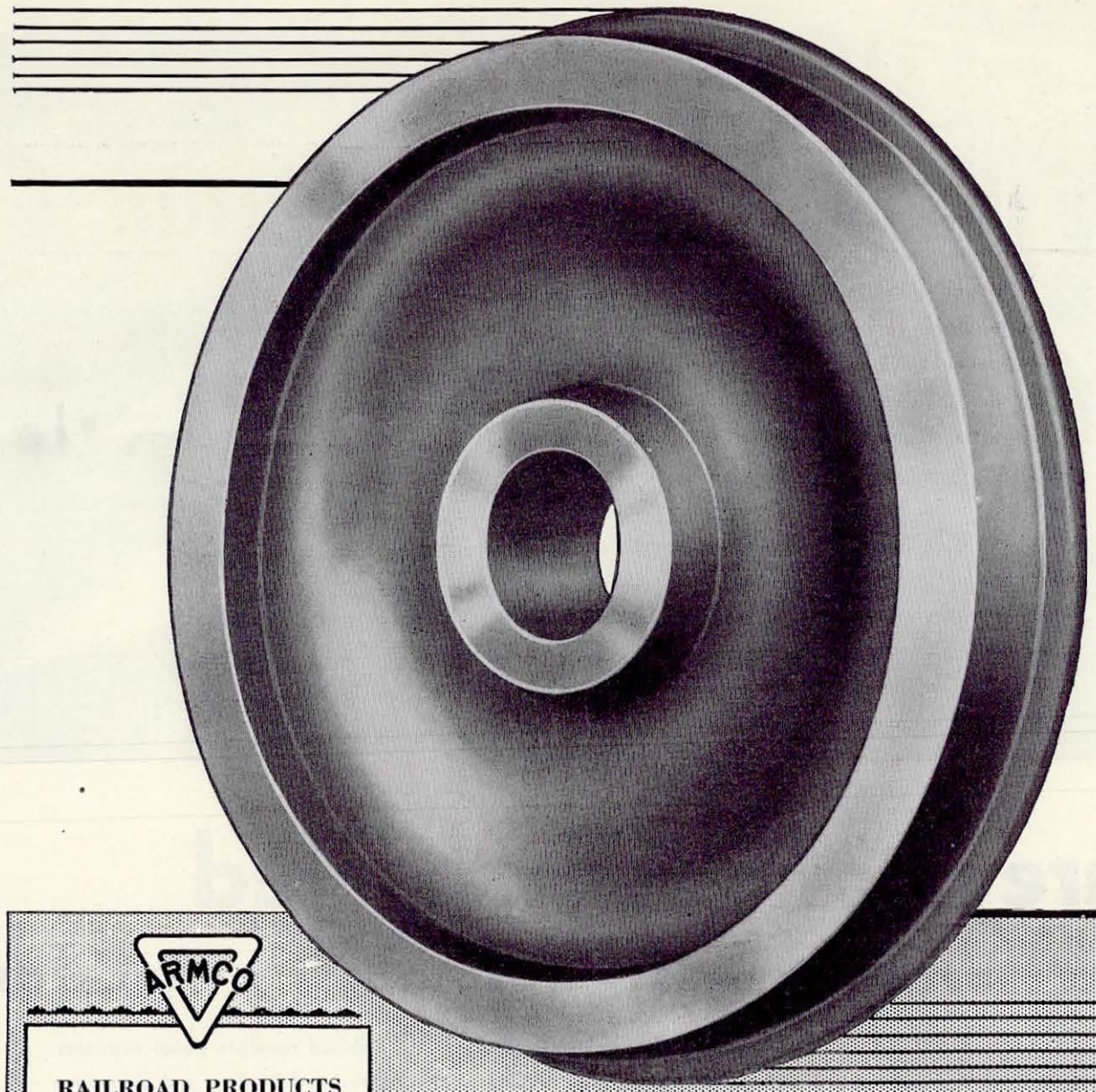

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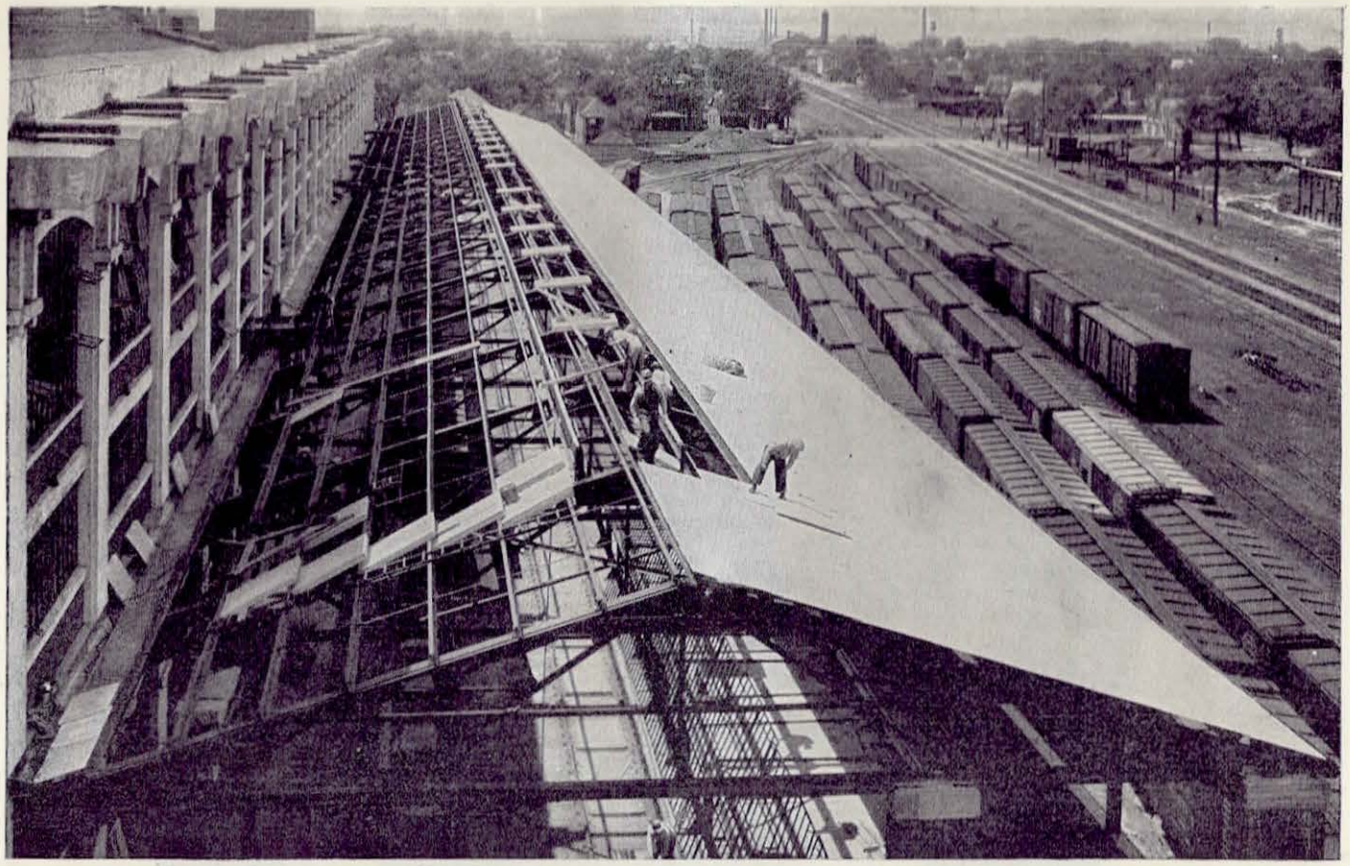

Roofing a large loading shed with Careystone Corrugated.

Careystone Corrugated

banishes Rust, Rot and Fire Hazards

Careystone Corrugated used on

UMBRELLA SHEDS
STORAGE WAREHOUSES
LOADING PLATFORMS
FREIGHT HOUSES
TOOL SHEDS
YARD OFFICES
SHOP BUILDINGS
ROUND HOUSES
PASSENGER SHELTERS
PIERS & DOCKS

In these days of strenuous effort to make railroad receipts equal expenses, the arguments for the use of Careystone Corrugated Roofing and Siding are unanswerable. Made of asbestos fibres and Portland Cement, Careystone Corrugated contains nothing to rust, rot or burn. The first cost is low, and maintenance expense is practically eliminated, since painting or other preservative treatment is never required.

Careystone Corrugated Roofing and Siding is applied directly over the structural steel, no sheathing being necessary. The large sheets are factory-cut to size; consequently, application expense is minimized. Our engineering department will supply, on request, sketches and complete information concerning the use of Careystone Corrugated on new or old structures.

THE PHILIP CAREY COMPANY :: Lockland, Cincinnati, Ohio

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BUILT-UP ROOFS
ASPHALT PRODUCTS
ELASTITE EXPANSION JOINT
WATERPROOFINGS
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Carey PRODUCTS EST. 1873

HEAT INSULATIONS
ASBESTOS MATERIALS
CAREYSTONE CORRUGATED SIDING
ASFALTSLATE SHINGLES
BUILDING PAPERS

569

Brake Gear Details for Today . . .

THE DEMANDS and responsibilities of brake gear details increase with the growth of the locomotive, the longer trains, the higher speeds.

For more than fifteen years, Schaefer has kept pace with railroad development. Schaefer Brake Gear Details have never failed to meet the added demands placed upon them by larger and more powerful engines and more drastic braking service.

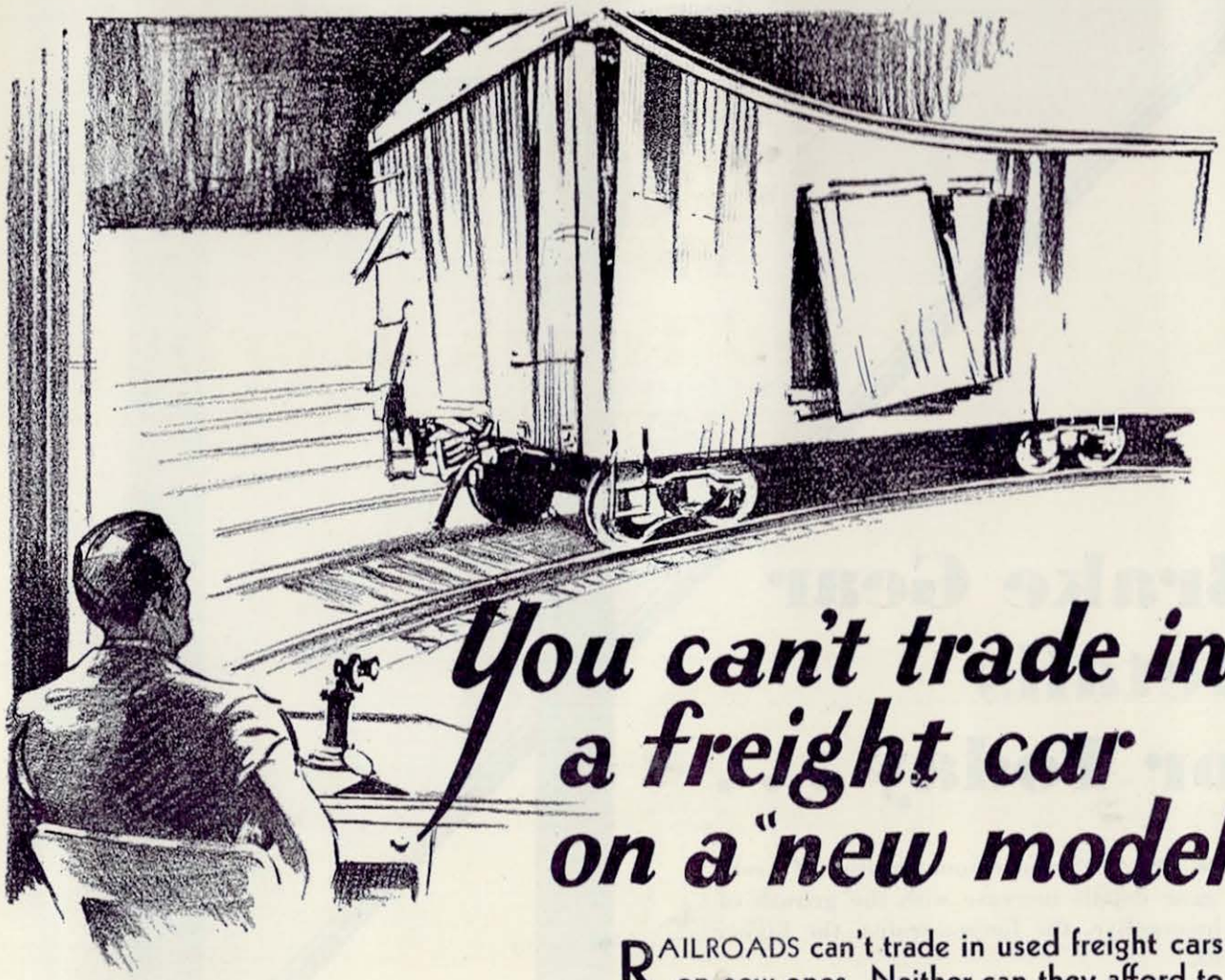
Specify Schaefer Details. They are forged in one piece of special wear resisting steel, free from welds, reinforced at points of greatest stress and greatest wear, and meet all A. R. A. requirements.

They are the modern brake gear details made especially for the service demanded in present day train operation.

SCHAEFER EQUIPMENT COMPANY

General Offices

KOPPERS BLDG. . PITTSBURGH, PA.

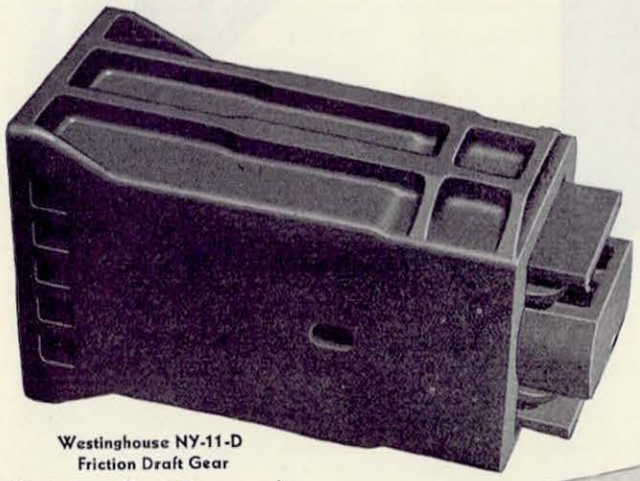


You can't trade in a freight car on a "new model"

RAILROADS can't trade in used freight cars on new ones. Neither can they afford to discard freight cars after three or four years and replace them with the modern, newer, stronger, heavier cars.

Give these lighter cars the increased protection they need by replacing inadequate draft gears with Cardwell or Westinghouse Draft Gears.

CARDWELL WESTINGHOUSE CO.
332 S. Michigan Avenue, Chicago, Ill.

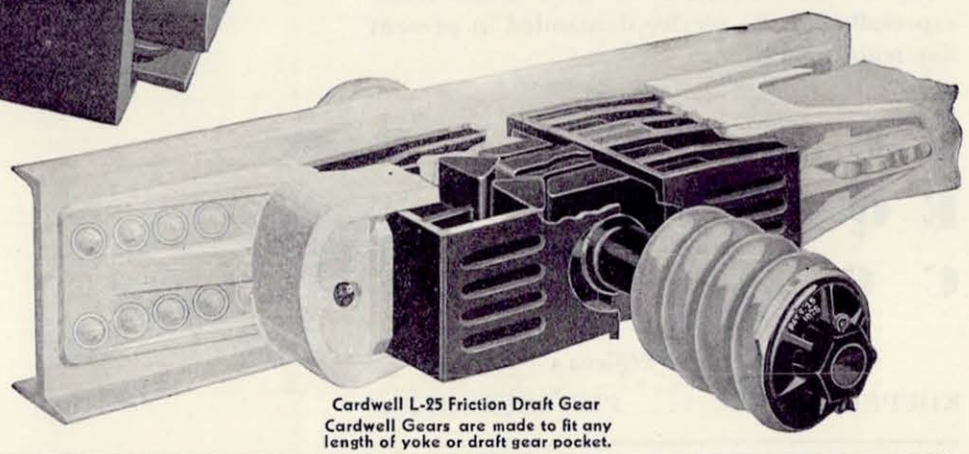


Westinghouse NY-11-D
Friction Draft Gear

Westinghouse Draft Gears can be applied with any type of attachments.

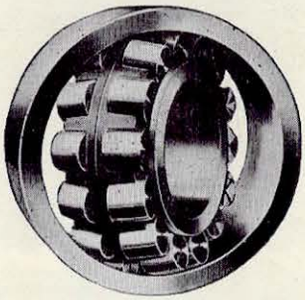
Cardwell and Westinghouse
Draft Gears

Are made in sizes and capacities to meet all modern and A. R. A. requirements for locomotives, freight and passenger cars.

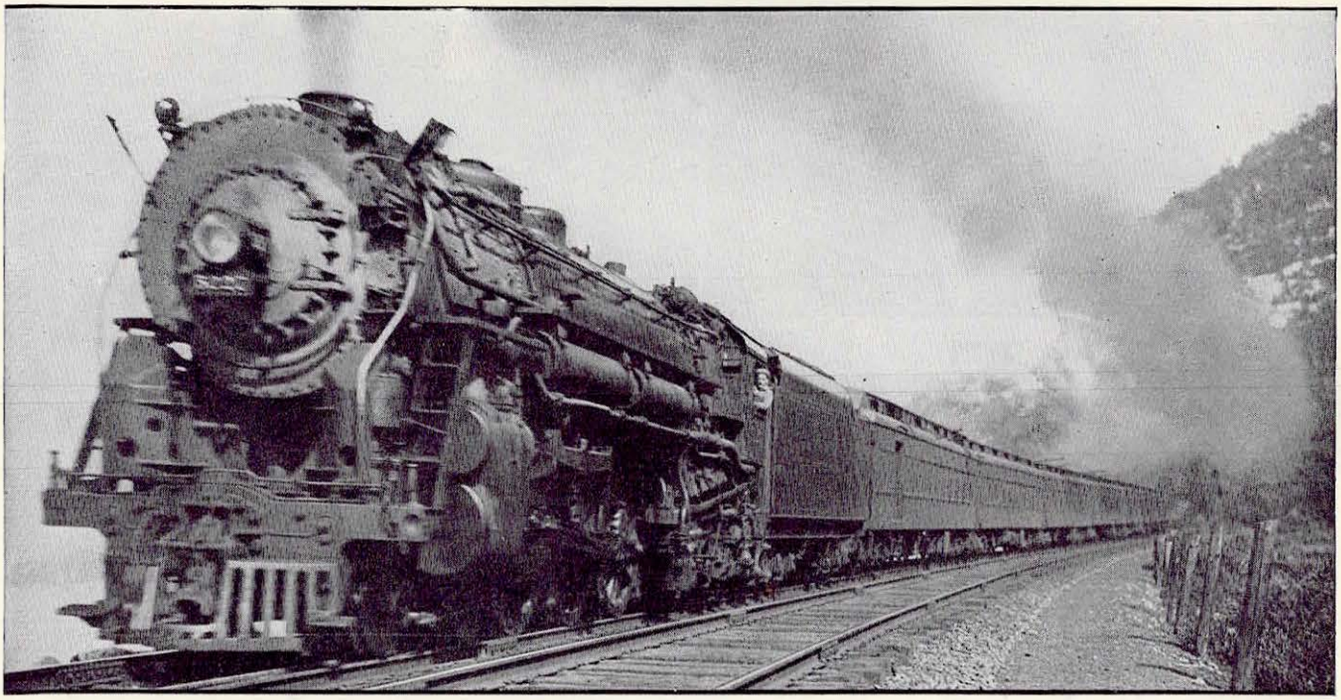


Cardwell L-25 Friction Draft Gear
Cardwell Gears are made to fit any length of yoke or draft gear pocket.

GOOD DRAFT GEARS MAKE CARS GO FARTHER



Are Your Lead Truck Bearings



Equal To Their Job?

IT has always been necessary to keep a close watch on leading engine truck bearings.

But with weights and speeds increasing you can no longer afford to nurse along the old plain bearing.

Engine trucks involve a combination of lateral and radial loads; the lateral loads reversing frequently. Moreover, keeping the plain bearing surfaces in good condition and keeping them well oiled is difficult in an engine truck bearing because of its unfavorable design and difficult operating conditions.

The SKF Journal Bearing, on the other hand, is ideally fitted for this class of service, as it will carry either lateral thrust or radial loads, or any combination of the two, on rolling elements with complete flexibility and with all load-carrying surfaces continuously lubricated.

SKF Journal Bearings on engine trucks are reducing the number of engine detentions; reducing the time required for inspection and maintenance and increasing the usefulness of the locomotive.

2770

SKF

JOURNAL BEARINGS

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Expensive Carding

Flat plate doors mean frequent carding to rip-tracks.

AJAX
CORRUGATED
DROP DOORS

are so much stronger that they mean a large reduction in rip-track repairs.

UNION METAL PRODUCTS COMPANY

NEW YORK · CHICAGO · ST. LOUIS · WASHINGTON
RICHMOND · HOUSTON · SAN FRANCISCO · KANSAS CITY · MONTREAL

"STANDARD 'QT'" WHEELS

OVER 2,000,000,000 WHEEL-MILES **have demonstrated the super-service of "Standard 'Q T' " steel wheels. Under the heaviest loads and most severe conditions of service these wheels have shown greatly superior structural strength and wear life.**

Scientific heat treatment, which produces high physical properties and refinement of structure, is responsible for the super-service of "Q T" wheels. These wheels are uniformly Oil Quenched *throughout* and Tempered to relieve *all* internal strains.

For maximum safety and minimum operating cost — use Standard "Q T" Wheels.

STANDARD STEEL WORKS COMPANY

GENERAL OFFICES & WORKS: BURNHAM, PA.

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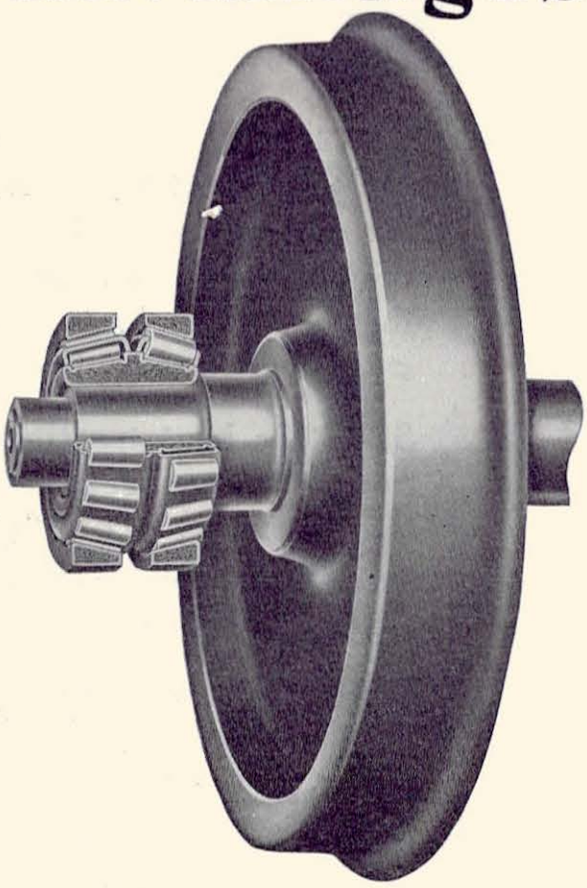
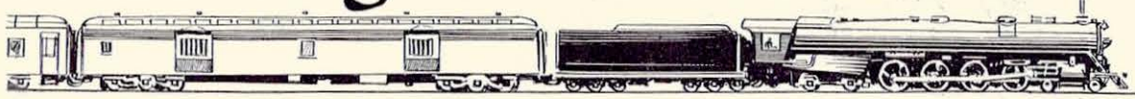
88% Less

one of the many advantages



TIMKEN *Tapered Roller*

starting resistance is only



# of Timken Bearings

Enabling the heaviest and longest passenger trains to be started 88% more easily, and without jerk or jar, is in itself a valuable feature of Timken Bearing Equipped cars, but it indicates still more valuable advantages.

It proves that friction is practically eliminated, and this in turn means *no hot boxes.*

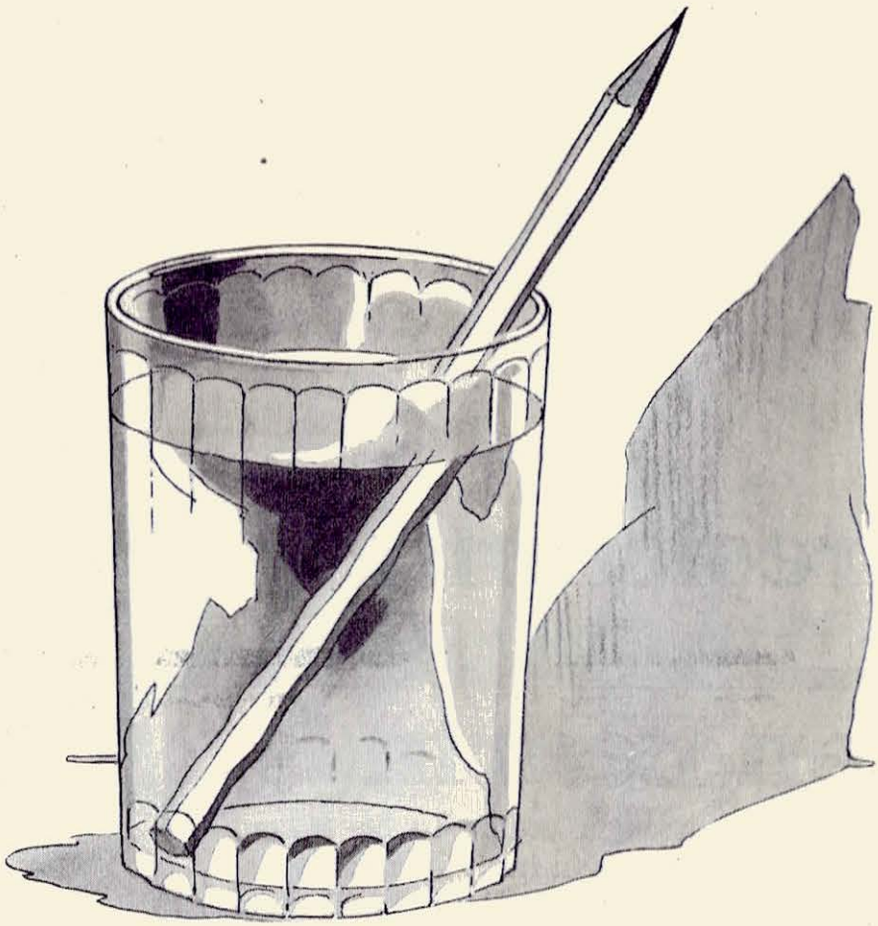
With the hot box handicap removed, faster schedules involving higher speeds and longer non-stop runs become practical, enabling railroads using Timken-equipped trains to revise their services in line with today's demands.

Reduced operating and maintenance costs are additional benefits derived from the same source. Frequent journal box inspections are done away with. Large lubricant savings are effected. Replacement expense is cut to the bone.

Summer and winter alike, Timken-equipped trains move with swiftness and precision, bringing to their passengers a degree of restful comfort and riding enjoyment unsurpassed as a good will and sales asset.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

BEARINGS



Even the Straightest Stick Looks *Crooked* in Water

LOW first cost of a car roof is just as much an illusion as the crooked appearance of a straight pencil immersed in water. The cost of application, durability, length of service, cost of repairs and maintenance must be considered.

True, the Universal Dry Lading Roof may be higher in first cost—but see what it saves. When the Universal roof outlasts the car, remove it and place it on another car. It consists of only nine one-size and one-design parts. These parts fit any width, length or design of house car. The roof is weatherproof and stays weatherproof. It never buckles. The spelter coated steel parts resist rust and do not require periodic painting. Maintenance is practically nil. For example, the cost of roof maintenance, on 30,000 Canadian National Cars equipped with Dry Lading Roofs, amounted to $4,519.49 over a period of 18 years. Less than one cent per roof per year.

Do you wonder why we say the first cost is the last cost?

Hutchins Car Roofing Company

RAILWAY AGE

Business Men and Government in Business

Announcement was made in Chicago last week of the formation of an organization of great potentialities. It is called the "Federation of American Business Men", and the meeting at which it elected temporary directors was attended by 70 leaders in 24 industries. "The purpose," said a statement issued, "is to put an end to the undermining of the principles of American government by the encroachment of socialism and communism. The form taken by communistic encroachment is the putting of government into competition with private initiative in scores of different industries. * * * This organization proposes to crystallize and organize public sentiment, not only against further government encroachment in business, but it proposes to force the government out of the business and industries which it has invaded."

The principal cause of the coming, prolongation and deepening of the present depression both in this and other countries has been government activities of certain kinds. These government activities have had two major effects. They have helped to destroy the economic adjustment between different countries, industries and classes of the people, and they have caused enormous increases in government expenditures and taxation. Whatever their purposes, these activities usually have been hardly less ruinous in the long run to those they have been intended to help than to those they have been intended to force to give the help. In the United States the railroads have been brought to the verge of ruin by government policies intended to help others at railroad expense, while the wheat and cotton farmers are being threatened with ruin by policies intended to raise the prices of wheat and cotton, but which, by stimulating production, have caused their prices to sink to almost the lowest levels in recorded history.

Effects of Government Competition

The statement issued by the Federation of American Business Men indicates that its purpose is to force government out of competition with private business. The principal initiators of the movement are engaged in the marketing of farm products. Their business has been injured by direct government competition under the Farm Relief act through the purchase of farm products, and by indirect competition through the subsidization of farm co-operatives. Doubtless, therefore, the movement intends to attack both direct and indirect government competition.

Merits Railroad Support

If this is the case it is a movement in which managers and owners of railroads will be much interested and which they should support. The railroads are being subjected to direct government competition through government ownership and operation of the barge line upon the Mississippi river system. They are being subjected to indirect government competition by carriers being allowed by government to use waterways and highways in competition with the railways without paying adequately for their use and without regulation comparable with that applied to the railways.

The effects upon the railways of this direct and indirect government competition are obvious. The effects upon many other industries are less plain. For example, it is not plain to most persons, but it is a fact, that the great building industry is being injured by a policy of taxation which results in users of waterways and highways paying inadequately or nothing for their use, and in hundreds of millions of dollars of the taxes that they should pay being directly or indirectly imposed upon the owners of real estate. By this policy the building industry is artificially depressed while the road building and motor vehicle industries are artificially stimulated.

The two things most essential to the restoration and prolongation of prosperity are, first, that all classes of individuals and business concerns shall readjust themselves as best they can to the new conditions

created by the general decline in prices, incomes and property values; and, second, that every form of government interference with business shall be reduced or abolished. Many will find it impossible to adjust themselves to the new economic conditions as long as conditions continue to be demoralized by government interference and unjust and excessive taxation.

Demands for More Government in Business

Every business man knows that efforts to force the government out of business and to reduce the present ruinous burden of taxation will be strongly resisted by certain classes. The more intelligent farmers know that every form of government interference to solve the farm problem has aggravated that problem; but the less efficient and more clamorous farmers will doubtless continue to demand more "relief" from the government.

The effects upon the railroads and upon railroad employment of past government interference with the railways should be plain to railway labor leaders. Nevertheless, the Railway Labor Executives' Association has directed its executive committee and counsel to prepare a bill to be introduced in the next Congress to provide for a shorter working day and working week. The avowed purpose is "to reduce unemployment and stabilize employment". An important and inevitable effect would be a large increase in railway operating expenses. Labor leaders do not say in what way they expect the railways to get the earnings to pay the increased expenses. Plenty of politicians will be found, however, to advocate this and every other form of increased government interference with business favored by farmers or working men, and to oppose all reductions of government interference opposed by farmers or working men.

Most business men will agree that such forms of interference with business as are represented by farm relief legislation and legislation affecting hours of work and wages should be resisted and reduced. But it happens that all existing and proposed forms of government interference with business are not attributable to farmers, labor leaders and politicians. Some of the worst are attributable to business men, many of whom show quite as strong a desire to use the taxing and regulating powers of government for their own benefit, as do farmers, labor leaders or politicians.

Business Men as Socialists

Who is responsible for the ownership and operation by the government of a barge line upon the Mississippi river system, for the program of large government expenditures upon inland waterways to enable shippers to get their freight carried largely at the cost of American taxpayers, and for motor transportation upon the highways largely at the cost of the taxpayers? Business men are principally responsible. Likewise, business men have been principally responsible for numerous state governments providing workmen's compensation insurance in competition with private business, for the federal government engaging in the Boulder Dam project, and for numerous other similar government activities. Business men generally profess to be opposed to government interference in business, and when it takes forms that they do not like call it "socialism", "communism", and so on, but many of them favor every socialistic project or policy that they believe will increase their own profits.

Must Educate Business Men

This is the real reason why business men, who could be the most influential class in promoting sound government policies, actually exert very little influence for such policies. Possibly the Federation of American Business Men will change this situation, but if it is to get the government out of business, it will have to first educate and convince, not farmers, labor leaders or the general public, but business men. The greatest and most lasting national prosperity can be attained only by every individual, class or industry working out his or its salvation under natural economic conditions; and every form of government interference, control or subsidy to aid some at the expense of others is inimical to the national welfare because it creates artificial economic conditions. Nobody in the railroad industry will object to government regulation, provided its purpose and effect are to give the railroads the fair return to which they are entitled, and to adjust rates without discrimination as between all shippers and territories.

When, however, the power of the government is utilized to prevent an industry from making reasonable charges for its services, and to subsidize competition with it and destroy its business, as the power of government has been used against the railroad industry, there are produced artificial economic conditions which are disastrous to the industry itself and harmful to the entire public in proportion to the importance of the industry directly affected.

The trend of affairs in the railroad industry is only one important illustration of the effects being produced in this country by government interference with business and by wanton government squandering of the public's money. These effects ramify into every industry and are being borne by every class of the people. To reduce government interference with business as much as possible, and to reduce government expenditures drastically, and equalize and reduce the present ruinous burden of taxation, should be objectives of every person who believes in the capitalistic system prevailing in the United States and desires a restoration of prosperity under it. Business men as a class cannot effectively seek these objectives as long as so many of them are seeking and defending various kinds of socialistic policies and projects for their own profit.

Prosperity By Taxation

Active minds and brilliant ones—and others not so brilliant—are daily producing schemes for pulling industry out of its present slump. A favorite category of such schemes is that involving governmental expenditures on a colossal scale—largely for highway and waterway development. Certain observers have pointed out that periods of prosperity in the past have come out of the intensive exploitation of some new industry. At one time it was railroad development; at another, the radio and the automobile. Failing at the present time any new commodity for which a vast latent demand exists, the advocates of increased governmental expenditures would substitute the taxing power to force money into vast enterprises which unaided have not the appeal to attract investors' dollars.

To raise an oft-repeated question—What is wrong with this picture? If dollars voluntarily invested in railroads in the 'Eighties or spent for radios and automobiles in the decade just past have resulted in general industrial activity, why would not unwilling dollars wrung from the taxpayers and plowed into highways and waterways result in similar general prosperity now?

The answer to this question probably lies with the science of economics. The dollar spent in the direct gratification of a human want increases the general well-being. The seller wants the dollar more than he wants the article. The purchaser wants the article more than he wants the dollar. So both gain by the transaction. Taxation, however, is a different matter. The receivers of the taxpayer's dollar are glad to get it, but the taxpayer is much more reluctant than he is when parting with his money for something he wants. Taxation, and not voluntary investment, is the source of the revenues out of which waterways and highways are built. The users of the waterways pay nothing toward the cost of the facilities they use and the users of the highways pay but a part. The unwilling taxpayer pays the remainder. Construction costs paid by taxation, therefore, do not represent the same mutual satisfaction usually present in a buyer-seller transaction. The economic test of satisfying the contributor that he will get his money's worth is absent. And this test is the best one we have to insure a wise observation and utilization of our resources. The more money we spend without this test the more likely we are to run into extravagance and dissipation of our wealth.

Ask the shipper if he would like to ship his goods from Buffalo to New York by waterway at half the rail rate and he may possibly be willing to do so. Ask the person of moderate means whether he would prefer to go from Chicago to Philadelphia by bus at two cents a mile or by train at 3.6 cents and he may possibly prefer the former. But let us take the taxpayer and his contribution out of the picture for a moment and assume that the prospective shipper be urged to ship by water at thrice the rail rate or that the prospective bus passenger be charged 3 or 4 cents a mile instead of 2 cents—which undoubtedly would result if these forms of transport received no aid from the taxpayers but had to provide their own facilities as the railways do.

Quite evidently taxation, by its use to defray a part of the expenses of services not popular without such aid, diverts the purchaser from his normal habits of spending. It attracts him from something he would be glad to spend his money for to something he would not spend his money for, if it were not for its being made artificially attractive by tax aid. Viewed from the national standpoint, this means that tax aid to waterway and highway transport diverts traffic from a method which hauls freight for 1 cent a ton-mile and passengers (on the average) for about 3 cents a mile to other forms the *total* cost of which is much higher. The individual as a shipper or passenger gains by utilizing these tax-subsidized services, but does he not lose more as a taxpayer than he gains as a shipper or a passenger? Can national wealth and general prosperity be increased by any such process as this?

Suppose the boiler room in a factory is equipped with modern mechanical firing devices and that the boiler room foreman is held to strict accountability for all his costs. Suppose, however, that the president of the company should come to him and say, "As long as you use the mechanical firing devices your department will be charged with all its expenses, but if you will go back to hand firing we will charge your department with only one-fourth of the firemen's wages and we will pay three-fourths of them out of overhead." By a rapid calculation the boiler room foreman might find that the charges against his department would be lower under the president's plan and would thus embrace it, abandoning his efficient stoking machinery. But what of the welfare of the business as a whole? The money to pay the firemen's wages would be subtracted from the profits of the business as a whole just as surely when charged to overhead as if charged to boiler room operating costs. An industry foolish enough to follow such a policy would find its prosperity steadily diminishing. If it went too far with such a program it might go bankrupt altogether.

Is not the government which goes around to shippers and offers to assume a part of their freight bill if they will ship by water or highway, while holding them to the payment of total costs while they ship by rail, exactly analagous to the fatuous company president in the above who induced his boiler room foreman to abandon mechanical firing by offering to assume as overhead a large part of the costs of hand firing? If an industry with a president who pursued such a policy should decline in prosperity, no one would be at all surprised. Why then are we surprised that a nation pursuing the self-same policy also finds its prosperity on the wane?

Reducing Expenses at the Enginehouse

Changed operating conditions with respect to locomotive utilization and maintenance afford a real opportunity to save money by modernizing engine-terminal facilities

LONG runs and heavier trains, with fewer locomotives, have placed a heavy burden on engine-terminal facilities and forces. The problem of maintaining locomotives in proper condition to meet present-day demands and to avoid the necessity or probability of locomotives being held an excessive number of hours at engine terminals for repairs is pressing many railroads for solution. Antiquated engine-terminal facilities are showing up as costly "white elephants." Modern terminals with up-to-date facilities are proving to be money-savers, especially at the present time when "economy" has become the watchword for the railway executive.

Extended locomotive runs have passed the experimental stage and are now generally accepted as good operating practice. A western road now operates its passenger locomotives from 509 to 877 miles, whereas formerly they were operated over districts of from 102 to 175 miles. The same road now operates its freight locomotives over districts of from 162 to 325 miles as compared to its former practice of 75 to 147 miles. Another road is running locomotives 915 miles in passenger service. The adoption of extended locomotive runs enabled this road to withdraw no less than 25 locomotives from service with a consequent payroll reduction at a single engine terminal of $18,000 a month.

Increased locomotive mileage and time between general shoppings have added further complications to the problem of economical engine-terminal operation. Modern power, locomotive appliances and devices designed to secure efficient and economical operation, alloy steels and other special materials now used in locomotive construction have materially assisted the engine-terminal forces in keeping locomotives on the road. A few years ago the Union Pacific placed its articulated locomotives in the back shop for repairs after 12 months' service and an average of 40,000 miles. These locomotives are now operating 24 months between general shoppings with an average mileage of 93,000. Pacific type locomotives, which formerly operated from 14 to 16 months with an average of 125,000 miles, are now rendering from 18 to 24 months' service with 180,000 to 200,000 miles. The Chicago, Milwaukee, St. Paul & Pacific is getting 180,000 miles from its passenger locomotives and 90,000 from its freight locomotives between general repairs.

These examples illustrate what is now generally considered to be good practice in locomotive utilization and serve to emphasize the need of well-equipped engine terminals if full advantage is to be taken of the economies obtained from improved locomotive design and operation. A number of roads have already taken steps to accomplish this by installing new terminal facilities at strategic points.

Savings in Fuel Secured by Direct Steaming

The 29-stall enginehouse at the Riverside terminal of the Big Four at Cincinnati, Ohio, dispatches 50 locomotives a day, 58 per cent of which are in passenger service, 22 per cent in freight service, and the remainder in yard service.

The special feature of this installation is the saving in fuel secured by direct steaming. Estimating on a basis of the actual coal consumption in the power plant for a 55-day period, compared with operating conditions existing at terminals using the old steam-blower method of firing, the total annual saving is $20,763. The installation of the direct-steaming system in this particular instance was due to some extent to city smoke-restriction ordinances. However, this system reduces the time required for servicing locomotives, particular-

The photograph reproduced above is a night view of the engine terminal of the Toronto, Hamilton & Buffalo at Hamilton, Ont. A three-track mechanical cinder-handling plant is shown in the foreground.

ly where this involves emptying and refilling the boiler.

Another example is that of an enginehouse in which a hot-water boiler-washing system was installed in connection with direct steaming and saved $1.56 per day for three engines washed. The direct-steaming installation saved $1.01 per engine dispatched or $23,824 per year in operating costs, of the enginehouse, representing a saving of 27.5 per cent on the investment.

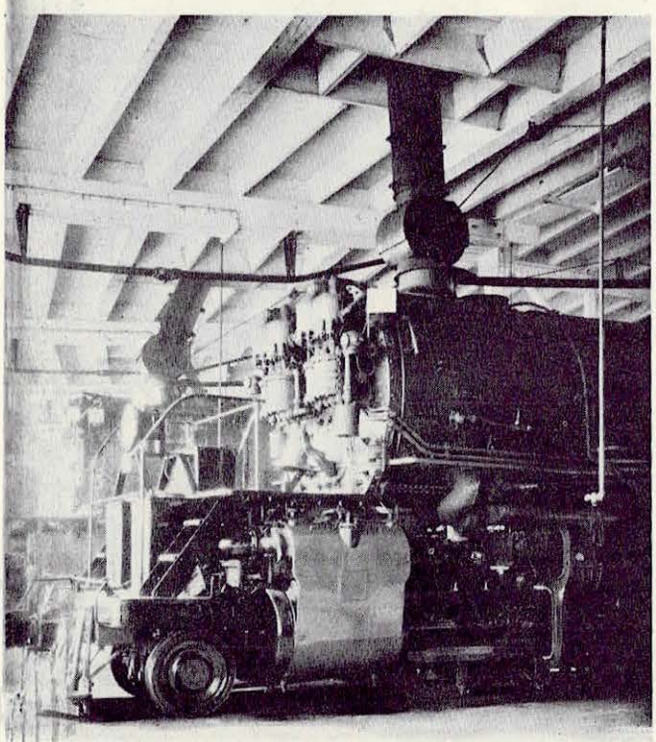
Drafting Locomotives Economically

Another device which has come into use in recent years in a number of enginehouses where locomotives are fired up in the enginehouse is a motor-driven blower which fits over the stack of the locomotive, under the smokejack. With this blower locomotives may be drafted in from less than 45 min. to 1 hr. 15 min., depending on the speed at which the motor is operated. At the higher speed the operation has been found to consume about 2½ kw.-hr. at a cost of about five cents. At the lower speeds the total power consumption and the cost of operation are considerably less. Savings in fuel per locomotive drafted average 75 cents, and from 20 to 25 minutes are saved in building up steam pressure sufficiently to operate the locomotive as compared with the steam-blower method. Of incidental value is the reduction in the waste of heat in the enginehouse through the smokejacks and the freedom from smoke and gases in the house.

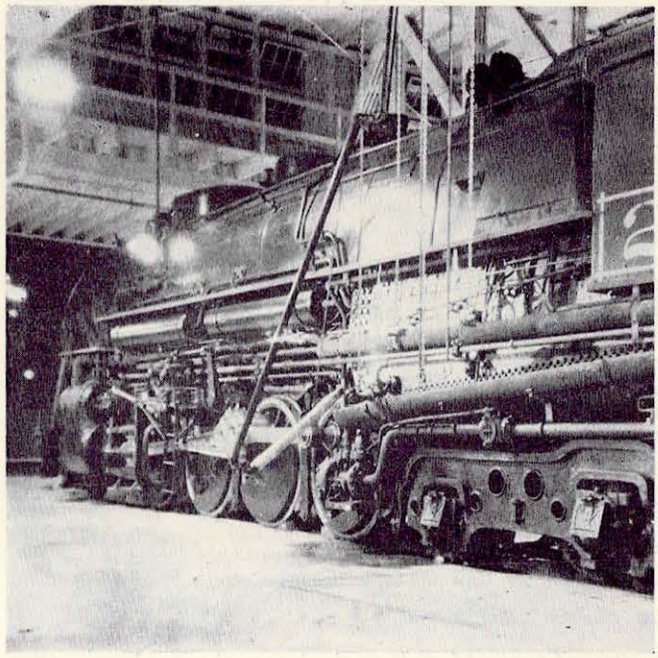
Modern Boiler Plants Show Substantial Economies

One of the most interesting examples of what can be accomplished in direct savings by modern boiler plants is that of the Great Northern. A number of years ago this road embarked on an extensive modernization program of its engine-terminal facilities, with the objective of realizing the full benefit from the many improvements in motive-power design and operating practice. Main-line power is now handled at 18 fewer enginehouses than in 1920.

This year the Great Northern is building three modern power plants at terminals where cheap stationary-



Saving Time and Labor in Steaming Up by Induced Draft



Steaming Up a Locomotive in An Atmosphere Free From Smoke and Gases

plant coal is available. While the highest standards of boiler efficiency have been aimed at, the capital expenditures involved have been moderate. The largest of these power plants, at Great Falls, Mont., serves a 36-stall enginehouse, the adjacent locomotive and car shops, and furnishes steam for heating these buildings, as well as the passenger station, freight depot and division offices at some distance (across the Missouri river bridge) from the locomotive terminal. Steam-driven equipment in the power house includes an air compressor, turbine pumps for a water filtering plant, duplex boiler-feed pumps and turbine-driven unit coal pulverizers for supplying the boilers with pulverized coal.

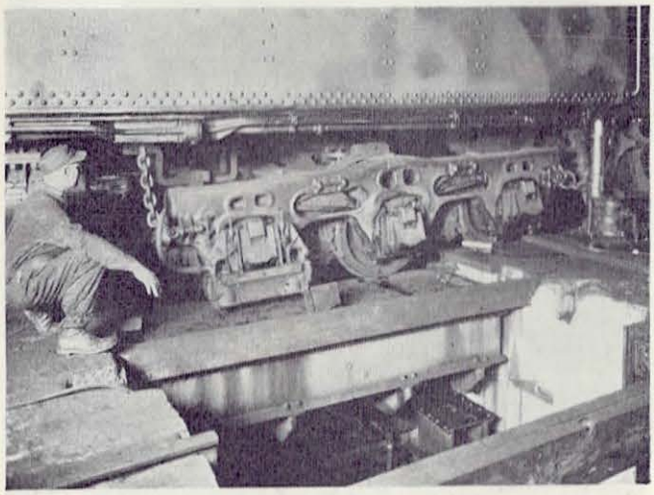
No electric generating equipment is provided as the electric current requirements are purchased under contract. For supplying the steam required at this terminal the new power plant is equipped with three 350-hp. boilers designed to burn pulverized coal. The plant is equipped with modern facilities and instruments for efficient operation and control.

This new power plant supersedes an old boiler plant typical of many terminal installations still in use, comprising three horizontal return-tubular boilers of 150 hp. capacity each and five locomotive boilers, all oil-fired and consuming fuel oil at the average rate of about 1,400 lb. an hour. In addition to this the new power plant supersedes a large oil-fired locomotive kept under fire in the enginehouse as a temporary expedient for supplying the direct-steaming system pending construction of the new power plant. The total fuel oil consumption at this terminal has been costing the railroad about $5,000 per month, which will now be reduced to a coal consumption of less than 1,500 tons a month at a price of $1 per ton—a saving in fuel of more than $40,000 a year.

The entire power plant project at Great Falls cost the railroad less than $200,000, exclusive of the equipment already on hand, such as air compressors, etc., which were utilized in the new plant.

Fuel and Ash Handling Facilities

There are few, even of the smaller terminals, at which coal or ashes can economically be handled man-



Adequate Drop-Pit Facilities Save Money—Lowering the Back End of a Six-Wheel Tender Truck to Insert Liners in the Center Casting to Maintain Correct Height—The Tender Is Held Up by Jacks

ually. At one 15-stall enginehouse the modern coaling station and cinder-handling equipment has shown an annual saving of $17,200.

The character of coal- and ash-handling facilities which will produce the greatest economy depends upon many conditions which vary widely at different terminals. This general subject will be discussed in detail in an article which will appear in a later issue of the *Railway Age* as one of the series on railway operating economies.

Material Handling Equipment

An electric crane truck costs around $5,000, depending, of course, on the design, type of crane, etc. The truck requires battery charging facilites and the constant-potential method of charging as now developed serves greatly to prolong the life of a battery. If desired, an extra battery will permit keeping the truck in service practically 24 hours a day. Here are some of the labor savings that two engine terminals have made on a crane truck which cost $5,500.

One enginehouse saved 30 min. time and $1.09 per air compressor changed; the other saved $1.05 on removing 8½-in. cross-compound compressors and $1.05 on application. In handling main reservoirs off and on a locomotive, one enginehouse saved 91 cents, while the other saved $2.52. Changing main rods with the assistance of a crane truck saved $1.60 per main rod changed compared to the former method used. Door rings are changed at a labor cost of $1.37 as compared to $2.74 by the old method without a crane truck—a saving of 50 per cent.

The other enginehouse on which the crane-truck operating costs were obtained shows a labor saving of $2.14 on changing boiler smokebox parts, and, on locomotives equipped with feedwater heaters, a saving of $2.75. An item of special interest is the saving in labor of $1.56 for removing a steam-dome cover secured by 16 studs, while $3.11 is saved in applying a cover secured by 32 studs.

Changing Driving-Wheel Tires Reduced from Ten to Four Hours

The installation of modern drop tables in an enginehouse saved $1.85 in labor on dropping a pair of driving wheels. The labor saving in renewing tender-truck wheels amounted to $5.18; in renewing engine-truck wheels, $3.51, and in renewing driving springs, $8. The labor cost of raising the front-end of a locomotive was reduced by $4.84, and the saving in labor for changing trailer-truck hub liners amounted to $4.86.

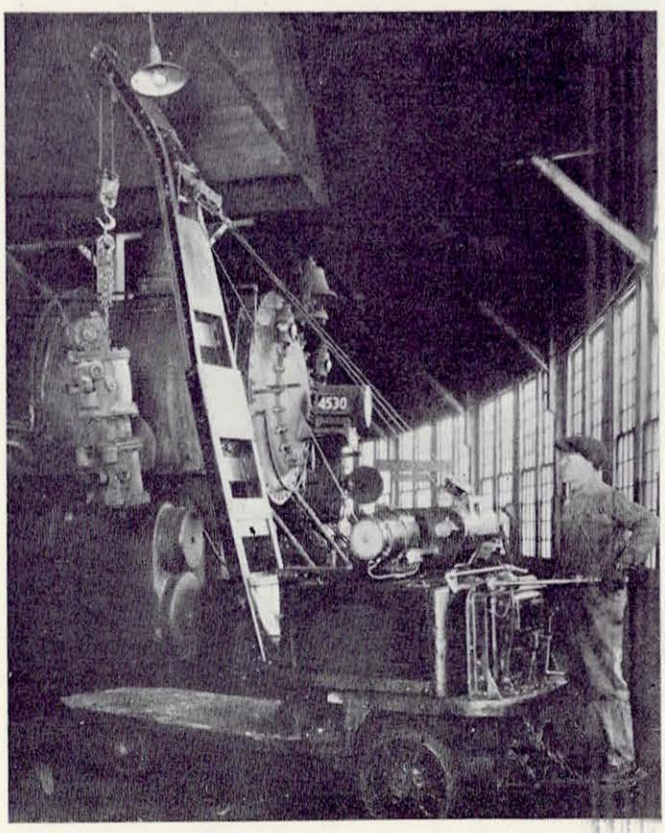
The effectiveness of a drop table for changing tires at a real saving in money is illustrated by the following example. To change a front driving-wheel tire on an eight-wheel switcher, the engine is run over the drop table and the table is lowered, leaving the front wheel suspended over the space left by the lowered table. The tire is heated with a portable tire heater and, when sufficiently heated, is driven off from the wheel center into the space between the guides and the wheel.

Of course, the front side rod is taken down previous to starting the job. An electric-crane truck is used to assist in removing the side rod and is also used to drop the old tire into the pit. A new tire is raised, heated and applied to the wheel center. With this method it is only necessary to remove the front side rod, no other parts need be dismantled. A machinist and helper can do this job in four hours as compared to ten hours by the old method. The utilization of a drop table, electric crane truck and portable tire heater shows an actual saving of approximately $9.00 on this job alone.

There are a considerable number of small tools and devices designed to expedite the servicing of locomotives at enginehouses. One such device, a pressure gun, for filling rod cups with grease—costing only a few dollars—reduced the engine preparation costs at a terminal handling 106 locomotives every 24 hours approximately $100 per locomotive per year. The savings in this one item of terminal expense amounted to $9,986 a year.

Enginehouse Lighting

Engine houses are usually the most poorly lighted of all railroad buildings in which work is performed. In some of the older type houses it is often necessary to use two men to do one man's work; one to do the job and



Modern Power Requires Modern Material-Handling Equipment to Expedite Running Repairs

the other to hold the light or torch. Enginehouse lighting presents a real problem because of the shape of the building and the location of large black shapes (locomotives) side by side, and because of dirt, smoke and steam. However, with the advent of better designed houses, improved ventilation, induced drafting and direct steaming, it is now possible effectively to light enginehouse interiors by the use of overhead lighting units.

No figures are available to show just how much more quickly work can be performed in a well lighted house as compared with a poorly lighted house but the effect may be inferred from the result of tests made in industrial plants. The average of a number of such tests shows that changing from the use of bare lamps to lamps in proper reflectors effected a 4 per cent increase in production, and then raising the illumination from 6 foot-candles to 13 foot-candles effected an additional 4 per cent increase in production. In the plants in which the tests were made, the average saving to the manufacturer was more than five times the added cost of better lighting.

In Next Week's Issue

The elimination of written train orders and the direction of trains by the indication of signals, which, together with power-operated switches, are controlled from a central point, afford an excellent opportunity to reduce operating expenses. As about 40 major installations of this centralized traffic control system have been placed in service during the last five years sufficient data are now available to prove that savings of from 18 to 65 per cent on the investment are being realized, as will be explained in detail in an article in next week's issue.

Good lighting is also an important factor in the prevention of accidents. Insurance records show that the annual cost of accidents to industry in the United States is twelve billion dollars per year; this includes 100,000 accidents. The records further show that in 75 per cent of these accidents, poor illumination was a contributing factor and that in 15 per cent, poor illumination was the direct cause.

Modern Terminal Facilities Are Required To Maintain Modern Locomotives

Engine-terminal equipment, whether it be fuel or cinder plants, drop pits, material-handling equipment, portable tools or small tools that can be no longer classed as modern, are distinct liabilities. In times when earnings are high, terminal facilities that have passed their period of greatest economic usefulness are tolerated because the service that they can render, unsuited as it is to modern traffic demands, is needed. When railroad business conditions are as they have been for the past two years, the up-to-date mechanical department officer is checking up pretty carefully on the operating costs of individual units to determine the actual savings that could be effected by their replacement with modern equipment.

The maintenance of equipment—locomotives and rolling stock—requires approximately one-third of all the money spent by the average railroad for operation and it is in the constant reduction of unit costs of operation that the railroads should have the greatest hope for increasing net railway operating income. It has been well demonstrated that it is possible to haul longer trains greater distances with modern locomotives at substantial savings in operating costs. But what is to be gained if the savings made in operation are absorbed by higher maintenance costs? Modern trains are not being hauled by 30-year old locomotives and it is not reasonable to expect that modern locomotives can be maintained efficiently and economically by obsolete terminal facilities.

Southwestern Lines File Store-Door Tariff

AFTER several months of negotiations, the Southwestern lines have prepared and filed with the Interstate Commerce Commission and the respective state commissions, Southwestern Lines Tariff No. 88, providing for pick-up and delivery service of l.c.l. freight at some 3,000 stations in the southwest and in a portion of the western trunk line territory. The area affected includes the states of Arkansas, Colorado, Illinois, Kansas, Louisiana, Mississippi, Missouri, Nebraska, New Mexico, Oklahoma, Tennessee, and Texas, either in whole or in part. Among the principal participating carriers are the Atchison, Topeka & Santa Fe; the Chicago, Rock Island & Pacific; the Colorado & Southern; the Illinois Central; the Kansas City Southern; the Missouri-Kansas-Texas; the Missouri Pacific Lines; the St. Louis-San Francisco; the St. Louis Southwestern; the Southern Pacific; the Texas & Pacific, and the Wabash.

Fundamentally the tariff provides that pick-up and delivery service will be offered without charge on l.c.l. freight, with certain exceptions, which moves a distance of not to exceed 300 miles. Although other railways, including some of those participating in this tariff, have already afforded free pick-up and delivery service to their patrons through one means or another, this is the first instance in which all of the railways in a territory of substantial area have acted jointly in extending their transportation service to the doors of shippers and consignees. The pick-up and delivery service will be rendered by motor trucks for which the railways, acting individually, will contract with drayage companies located in the affected cities and towns.

The tariff divides the territory covered into zones as follows: Zone 1 extends across northern Missouri and for a short distance into Kansas; Zone 2 covers the remainder of Kansas and most of the remainder of Missouri; Zone 3 includes Arkansas, the eastern part of Colorado, the western part of Louisiana, the southern portion of Missouri, and a part of Oklahoma and Texas; Zone 4 includes the Oklahoma and Texas Differential Territory; and Zone 5 includes all stations on the lines of the participating carriers in New Mexico, except stations west of Albuquerque, Belen and Deming.

No charge will be made for the pick-up and delivery service on shipments moving as follows: Shipments between stations included in Zone 1 from and to which the interstate all-rail rates on first class does not exceed $1.10 per 100 lb.; shipments between stations included within Zone 2 and between these stations and stations in Zone 1, from and to which the interstate all-rail rate on first class does not exceed $1.24 per 100 lb.; shipments between stations included within Zone 3 and be-

(Continued on page 372)

A 10,000-Gallon Water Car, One of 31 Operated by the M-K-T

Speeding Up Trains With Water Cars

Missouri-Kansas-Texas eliminates water stops, resulting in savings in time, train miles, fuel, and boiler repairs

STEPS taken several years ago toward the elimination of water stops between division terminal points, on the Missouri-Kansas-Texas, have not only effected an actual out-of-pocket saving in fuel, but have also contributed to efficient operation by permitting better train movement and increased train loading. These water stops have been eliminated chiefly through the use of 48 water cars, or auxiliary tenders; and, based upon present operations, their use has resulted in an annual return of 67 per cent on the investment in equipment and fixed property, which is shown in Table I.

When the subject of eliminating water stops on the Katy was first studied a number of years ago, several oil tank cars that were no longer needed for company fuel service were fitted up as auxiliary water cars. The domes were removed to provide clearance under water spouts and end connections were applied. The cars were hauled immediately behind the locomotive tender, and their operation resulted in a very considerable saving in fuel and time, besides the intangible but nevertheless actual in saving in wear and tear of equipment that has undergone less strain in stopping and starting at water stations.

Table I—Katy Investment in Water Cars

Total investment in water cars	$109,988
Fuel saving, 15-day period	2,879
Fuel saving, one year	70,046
Average repair cost per car per year	125
Total repair cost per year	6,000
Net saving, fuel saving less repair cost	64,046
Net saving less depreciation at 3 per cent per year	60,747
Return on investment, per cent	55.23
Annual saving through closing 18 water stations	$13,178
Return on investment, per cent, including saving through closing water stations	67.21

Extended use of these cars required the building of ten 15,550-gal. water cars, especially designed for this service, in the M-K-T. shops during 1930. Earlier equipment consisted of rebuilt oil tank cars with capacities ranging from 6,000 gal to 10,000 gal., all of which have been continued in service. Seven of the cars range in capacity from 6,300 gal. to 7,091 gal., 10 are of 15,550-gal. capacity and 31 are of 10,000-gal. capacity. The smaller-type cars are used only in local and branch line service, and the entire operation of water cars is limited to freight service. It is planned to place additional cars in service when their use is required.

Table II—Katy Water Car Operation During 15-Day Test Period

Trains operated with water cars	708
Number of stops eliminated	1,561
Time saved, eliminating water stops	359 hr. 55 min.
Time, filling water cars enroute	36 hr. 35 min.
Net saving in time	323 hr. 20 min.
Time saved, meeting trains	240 hr. 35 min.
Total time saved	563 hr. 55 min.
Cost of fuel saved, eliminating stops	$1,917.53
Tons coal, or gal. of oil, saved	100,394
Cost of fuel saved, meeting trains	$961.09
Tons coal, or gal. of oil, saved meeting trains	50,319
Total tons coal, or gal. of oil saved	150,713
Total saving in cost of fuel	$2,878.62

Tests made at various times have shown that the operation of the cars has been fully justified by the savings effected, and that the anticipated savings have been realized. A recent test over a period of 15 days on five of the six operating divisions, or districts as they are called on the Katy, which included the use of water cars of all capacities, showed a fuel saving of $2,878 on the operation of 708 trains. The details of this test are shown in Table II.

A description of a number of trips on various districts will serve to show the results that the Katy has obtained from water car operation. In through freight service on the St. Louis district, extending between St. Louis, Mo., and Parsons, Kan., four 15,550-gal. water cars are assigned to the division between Baden (St. Louis) and Franklin, 180 miles, and four 10,000-gal. cars to the division between Franklin and Parsons, 197 miles. On the division between Baden and Franklin it has been possible to eliminate four regular water

stops. This latter division has a water grade over its entire distance, with the exception of 2.5 miles northbound on which 4,500 tons can be handled with one locomotive, and 4 miles southbound on which 4,000 tons are handled with a pusher engine for 1.5 miles.

Locomotives operated in through freight service on the St. Louis district are of the 800-900 Class, 2-8-2 Type, with a tender which has a capacity of 10,000 gal. of water and 18 tons of coal. They are coal-burning, stoker-fired locomotives, equipped with superheater, booster, piston valves, Walschaert valve gear and cross compound pump. The weight on drivers is 234,000 lb., while the total weight of engine and tender is 530,800 lb. Cylinders are 28 in. in diameter, with a 30-in. stroke, the working steam pressure is 195 lb., the drivers are 61 in. in diameter, the grate area is 70.4 sq. ft., the table grate air opening is 19 per cent, the total heating surface is 4,118 sq. ft., and the locomotive produces a tractive effort of 63,900 lb.

Train 73, Engine 904, left Baden on March 19 with 35 loads and 77 empties, and consumed 61 lb. of coal per thousand gross ton miles on the trip to Franklin. Four water stops were eliminated, avoiding one hour of delay and advancing the train 1 hr. 5 min. against other trains. By eliminating the water stops, the locomotive burned 4,400 fewer pounds of coal.

The train stopped at McKittrick, 91 miles west of Baden, for 30 min. to meet a passenger train, supply the locomotive and set out cars. Without a water car, it would have been necessary to meet the passenger train at Bernheimer, with a delay of at least 30 min., then proceed to McKittrick, where the work to be done would have caused an additional delay of at least 30 min. Operation over the territory in that manner would have also necessitated delays at other points to meet northbound trains.

Avoiding Stops on the Parsons District

The Kansas City division of the Parsons district, extending between Kansas City, Mo., and Parsons, Kan., 133 miles, has a ruling and maximum grade of 1.22 per cent northbound, and a ruling grade of 0.66 per cent and a maximum grade of 1 per cent southbound. The locomotives operated in freight service on the Kansas City division have the same dimensions as the Mikado type used on the St. Louis division, except that they are oil burners with a total heating surface of 4,179 sq. ft., and have tenders with a capacity of 10,000 gal. of water and 4,000 gal. of oil.

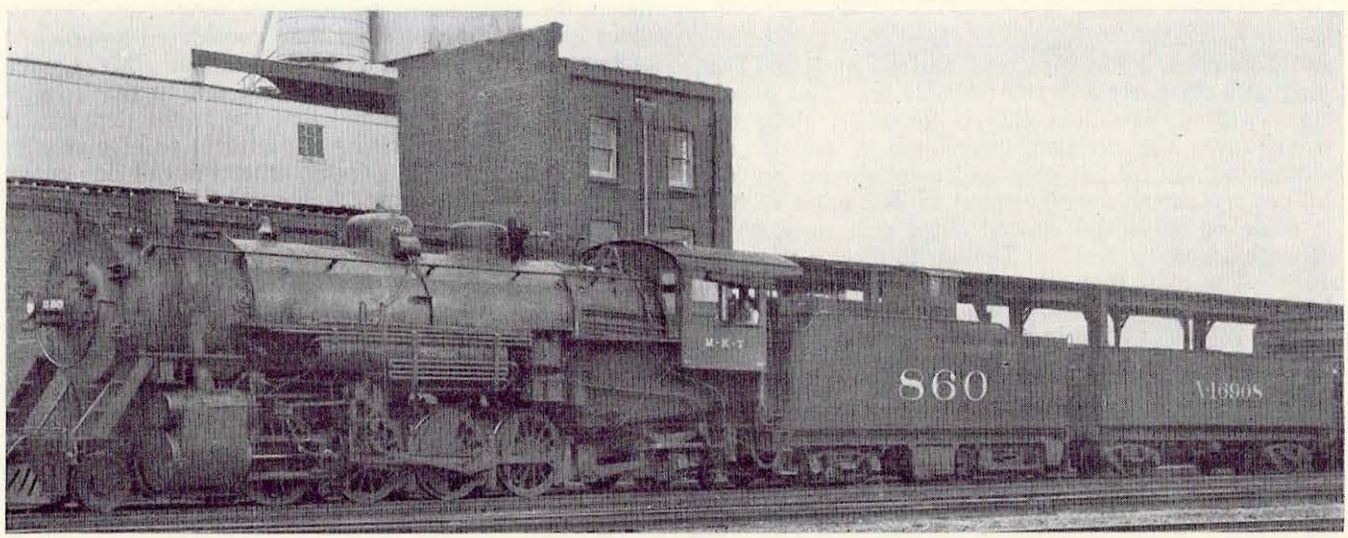
Another representative trip was that of Train 275, Engine 871, which left Glen Park (Kansas City) at 3:05 p.m. with 32 loads and 40 empties, 2,450 tons, and a 10,000-gal. capacity water car. At Kincaid, 79 miles from Glen Park, this train met Train 276, and at Erie, 117 miles from Glen Park, it met Extra 850, both opposing trains. Since Train 275 had superior right in both instances, it experienced no delays and arrived at North Yard (Parsons) at 8:25 p.m.

During this run the locomotive consumed 2,263 gal. of oil in handling 325,850 gross ton miles, or 6.9 gal. of oil per thousand gross ton miles, and saved, through the elimination of water stops, 400 gal. of oil. If no water car had been operated on this train, water stops of an average length of 15 min. would have been necessary at Paola, Centerville, Moran and Erie, stations 39, 66, 91 and 117 miles respectively from Glen Park. In addition, different meeting points for Train 276 and Extra 850 would have caused delays to Train 275 of 30 min. in each case, illustrating the opportunity the dispatcher had of arranging more advantageous meeting points with opposing trains.

Another trip, indicative of the economies effected by water car operation, was made on the Cherokee division of the McAlester district, which extends from Parsons to Muskogee, Okla., 117 miles. The ruling and maximum grade on this division is 1.143 per cent northbound, and 0.983 per cent southbound.

Train 72, Engine 890, an oil burner, left Muskogee at 12:45 p.m. on March 17 and arrived at Parsons at 5:45 p.m. The train was made up of 87 loads and 1 empty, 3,724 tons, when it left Muskogee, and at Wagoner, 16 miles from Muskogee, it spent 15 min. in setting out two stock cars. The train produced 391,398 gross ton miles, or an average of 78,279 gross ton miles per train hour, as compared to the general northbound freight train average for the district in March of 46,705. The locomotive used 2,144 gal. of oil and the fuel consumption per thousand gross ton miles was 5.4 gal., as compared to the through freight average on the division in March of 6.3 gal. The average speed was 23.4 miles an hour, as compared with the general northbound freight average for the district in March of 17.3 miles an hour. No water was taken enroute, and the 15,550-gal. water car permitted the elimination of two water stops of 30 min. each, saved an additional 30 min. that would have been consumed in meeting trains, and also saved 242 gal. of fuel oil.

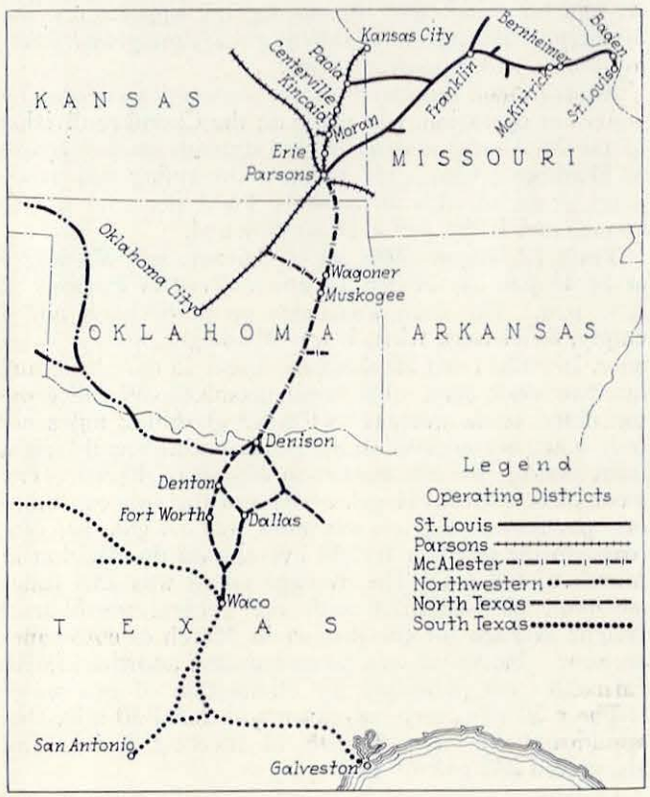
Density of traffic naturally influences the extent of the



This Water Car Has a Capacity of 15,550 Gallons

savings, not only from the standpoint of train loading, but also with respect to more suitable meeting points and quicker turning of motive power at terminals. Not all districts on the Katy have been able to eliminate water stations, but where that has not been possible, the use of water cars has been of decided benefit in the advancement of meeting points. On the North Texas district, while it has not been possible to abandon any water stations, the use of five 10,000-gal. water cars has facilitated the movement of important manifest trains with minimum delay. The cars are used in rotation, eliminating one water stop on the Fort Worth division and two each on the Dallas and Henrietta divisions for trains so equipped.

A trip made on February 19 will illustrate the effectiveness of operation with water cars on the North Texas district. Extra 876, handling perishable freight, left Ney Yard (Fort Worth) at 10 a.m. with 34 loads



The Operating Districts of the Missouri-Kansas-Texas Line

and 4 empties, 1,736 tons, and arrived at Ray (Denison) at 1:55 p.m., 3 hr. 55 min. later. The distance between Ney Yard and Ray is 95 miles. The train moved over the division, which has a ruling grade northbound of 1.2 per cent and a maximum grade of 1.3 per cent, at an average speed of 24.2 miles an hour. It made no stops and slowed down only once, to run through a passing track at Denton to meet a passenger train. The total fuel oil consumption on the trip was 1,092 gal., or an average of 6.6 gal. per thousand gross ton miles. The saving in oil through the use of a water car approximated 60 gal., and in addition the movement of the train was expedited materially. Savings similar to those effected on the North Texas district have been produced also on the South Texas district.

Another economy, in addition to those of a purely transportation nature, arises from a decrease in boiler repairs, resulting from the ability to avoid subjecting locomotive boilers to water in bad or untreated sections, and the mixing of various qualities of water enroute. These savings, while difficult of definite estimate, are nevertheless actual.

Reading Testimony on Traffic and Purchases

WASHINGTON, D. C.

A FURTHER hearing in connection with the Interstate Commerce Commission's Investigation of reciprocity in purchasing and routing was held before Director W. P. Bartel of the commission's Bureau of Service on September 1 for the purpose of further questioning of officers of the Reading on details of a mass of correspondence between shippers and its traffic and purchasing departments copied from its files by commission investigators and introduced in evidence at the Philadelphia hearing.

J. D. Landis, purchasing agent of the Reading, was questioned by M. C. List, attorney for the commission, regarding practices in connection with the purchase of "distress" coal, a point which had been brought up at the previous hearing. He said that the practice was to bill the consignee for the demurrage up to the hour when the coal was purchased by the railroad but that the coal was bought f.o.b. mine so that the railroad bore the freight rate up to the terminal. Mr. Bartel indicated some surprise at this method but Mr. Landis said that it often resulted in the road being able to get the coal for a price as low as or lower than the price of spot coal. Mr. List read from a letter from a coal company asking that the railroad date back its acceptance so as to eliminate the demurrage charge, saying that some other railroads had done so, but Mr. Landis said he had never heard of such a thing being done. Later E. D. Hilleary, vice-president in charge of traffic, said that the per diem on such cars of coal was handled between the railroads concerned and that the consignee had nothing to do with it.

Mr. List read from another letter that seemed to refer to an established basis by which the railroad would buy 25 cars of coal from the company in return for the routing of 300 cars of commercial coal, but Mr. Landis said there was no fixed basis. Mr. List also referred to many other letters in which coal shippers complained to the traffic department because the purchasing department had not bought what they considered a sufficient amount of coal in relation to the tonnage. Mr. Landis said that they complained to every one in reach in an effort to increase sales and that the traffic department often asked the purchasing department to give consideration to a particular shipper, other things being equal, but that it did not attempt to control the purchasing department. He also said that it was the policy to ignore a man who threatened to divert his tonnage and when letters were referred to indicating that shippers who had made such threats had been given some orders later he said that the orders were placed for other reasons. He denied that the traffic department had ever asked the purchasing department to place an order to pacify a shipper who had threatened to divert. He said it was, of course, the policy to buy from shippers on the line if the price and quality were right.

One series of letters contained threats from a coal company to divert its tonnage unless it received a liberal

(Continued on page 366)

How Increase Coal Tonnage?

High pressure gas no menace, but high pressure gas salesmanship demands same aggressiveness by coal industry and coal carriers

By C. V. Beck

President, St. Louis Coal Co. and General Sales Mgr., Lumaghi Coal Co.

SINCE the question of coal vs. natural gas has been vigorously stirred up in the last several months, the interest of the railroads in this matter has been shown to be very keen. Many important railroad executives show an earnest desire to defend their coal traffic from unwarranted encroachment by other fuels which move by pipe line and have come forward with the query to the effect, what can we do to help?

As pointed out in the editorial pages of the *Railway Age,* no matter what the economic advantages of the low cost of coal may be, the working of economic laws can be considerably delayed by skillful ballyhoo and much waste may result as a consequence. The coal industry and the railroads need have no fear from high pressure natural gas. However, they have good cause for concern over high pressure natural gas tactics and salesmanship and unless some determined definite and co-ordinated effort to fight fire with fire is made by those interested in coal, the momentum that competitive fuels have acquired may carry them much farther than sound economics warrant.

High Pressure—An Ubiquitous Characteristic

Natural gas is a high pressure industry! The gas itself, some of the methods of financing employed, the propaganda and sales methods used to sell the product, instances of local utilities being induced to distribute it against their desires when they can produce artificial gas cheaper, by the force of natural gas propaganda and threats to obtain separate franchises—high pressure from start to finish. It is a matter of common knowledge that enormous sums of money have been spent on propaganda in behalf of natural gas both in nation-wide and localized campaigns. It is also apparent that those interested in coal are poor propagandists and lack co-ordinated effort to either spread publicity or to advertise in their own behalf. This is really the only weakness inherent to the coal situation.

For the last two years coal has been literally smothered with adverse propaganda and advertising. The effort to market piped fuels has centered around selling the apparatus for burning them. Sales resistance to the appliances has been broken down by the general propaganda in favor of the fuels themselves, although it is the modern combustion apparatus that has made piped fuels desirable. The prevalence of obsolete equipment for burning coal has made the public consider coal itself an obsolete fuel.

Ease of Burning Coal Defers Adoption of Modern Equipment

There is available plenty of modern equipment for burning coal perfectly, smokelessly and without labor. The trouble with coal, however, is that it is too easy to burn. It is such an accommodating fuel that it will burn in any equipment and, therefore, consumers continue burning it by sheer force and awkwardness in equipment that is antiquated in the extreme, much of it having been installed for over 30 years. Piped fuels can be burned only in specific burners designed for them. The public's mind has been diverted from the real issue in a "coal vs. competitive fuel" campaign. It has been centered on the fuel itself, when as a matter of fact it should have been centered on the equipment for burning. Therefore the best defense for coal traffic is to correct this situation and center public opinion on burning equipment.

Rout Out and Junk Obsolete Equipment

The job before those interested in coal traffic at the present time is to rout out and junk obsolete equipment and see that modern coal burning equipment is installed. The largest users of fuel are of course aware of this situation. The moderate and small users are totally ignorant of it and even some quite large users have not faced the facts squarely. It is a merchandising problem—engineering education of the larger users and a more popular advertising appeal to the smaller users. Fortunately the last five years have seen a large amount of development for the benefit of the small user of coal. The small stoker has made its appearance and has been thoroughly refined until it is in some respects more reliable than piped fuel burning equipment. Such devices are being offered by over 60 different manufacturers in sizes suitable for the smallest domestic furnaces.

The public is not yet sufficiently acquainted with this apparatus, due to the fact that it is new and many of its manufacturers are still relatively small concerns. The story of "automatic smokeless heat with coal" has not been presented to the public since those in the industry have not had sufficient funds to match dollars in an advertising way with those interested in competitive fuels; nor has a sufficient sum of money been spent in developing the field such as has been done to develop the market for similar gas and electric household devices. In checking up the advertising expenditures of similar lines of endeavor for the year 1929 the following facts were developed: The electric refrigerator industry spent 200 times as much as the domestic stoker industry; oil burners spent 50 times as much; one electric refrigerator company alone spent 100 times as much; 300 times as much was spent on one brand of cigarettes.

Equipment, Not Fuel, Produces Desired Results

On the basic economics of the situation coal will win out in the long run. On the other hand, the greater the delay in getting the story of automatic coal heat over to the public, the greater will be the immediate tonnage lost to the railroads. Therefore, the interests

of coal seem to indicate that an immediate and broad campaign should be put on to call the attention of fuel users, particularly the small users, to the fact that it is equipment and not the fuel that produces the results. It takes much effort and large advertising sums to sell a new idea to a nation. Coal's competitors are doing it. Coal must match them. This is a cause that should enlist the support of all interested in coal or its handling. It would greatly hasten the day when the onslaughts of competitive fuels would be halted and insure that they be widely consumed only in spots where they are economic fuels, and this may mean that they would be practically removed from competition with coal, since all the spots where competitive fuels have an economic advantage are far away from coal-producing districts.

How can the coal-carrying railroads help in this matter? There are undoubtedly many ways. The first and direct thing that could be done would be for officers of such railroads to investigate the modern household stoker; become familiar with it, install one in their own homes and talk up modern automatic smokeless heat with coal, its convenience and desirability.

Spread "Automatic Smokeless Heat With Coal" Idea

Railroads directly or indirectly employ a considerable percentage of the public of the nation—some two million persons. Most of these roads depend upon coal to a large degree for their revenues. Nearly every railroad publishes a magazine for its employees. These magazines could feature articles showing the advantages of the modern household stoker, showing how easily it works, how in most regions remote from sources of supply of piped fuels it gives automatic heat at a cost of one-third to one-sixth that of its competitors. Railroad employees should investigate these devices, install them where they offer convenience and economy and help spread the news. A large number of installations will create a great amount of comment and the idea will spread by infiltration. In this way the "automatic smokeless heat with coal" idea could be effectively spread by railroads and railroad men and a large and important traffic be retained.

Use Direct Advertising

On the other hand, even more direct action by those interested in coal is desirable to counteract the tremendous publicity that competitive fuels are receiving at the present time in order to get the matter quickly before the general public. It would be well to raise a fund to advertise the advantages of the new era of automatic heat with coal. In view of the fact that the railroads haul considerably over 500,000,000 tons of coal per annum, it is apparent that the railroads interested in coal would be justified in joining in an advertising campaign on a large scale to defend this traffic. That a considerable sum for this purpose could be wisely, judiciously and profitably spent and that the most profitable line of expenditure would be to show the desirability of modern apparatus, there can be little doubt. In order to conduct a successful campaign it is necessary to have something definite and modern to sell. Fortunately, coal now has something new and modern to sell to the people of the country—*automatic, smokeless heat with coal.*

This idea will penetrate eventually without doubt, but it must be realized frankly that patrons lost to competitive fuels may stray from the fold for quite a few years. An effort in this direction now would materially and favorably affect the coal tonnage to be carried during the next few years.

Receivers for F. E. C.

THE Florida East Coast has been placed in the hands of receivers by the federal court of Jacksonville. This action, taken with the consent of the company, was the result of an application by the Standard Oil Company of Kentucky and other creditors. The company is also in default in interest due on September 1 on $45,000,000 of its first and refunding mortgage bonds. William R. Kenan, Jr., president of the company, and Scott M. Loftin have been named receivers.

The primary cause of the road's difficulties has been the sharp falling off in business since the collapse of the Florida boom in 1926—the boom which necessitated large capital expenditures by the railroad to meet the public's demand for transportation. Probably, however, in spite of the decline in traffic due to business conditions the road could still have earned enough at least to avoid receivership had it not been for governmental fostering and subsidizing of competing forms of transportation—waterway and highway.

A statement by President Kenan sketching the nature of the road's difficulties and their origin follows:

"In 1923 it become apparent that the existing single track railroad was insufficient to meet transportation demands and a double tracking program from Jacksonville to Miami was inaugurated to be gradually constructed over a period of years. In 1925 the business had increased so rapidly the railroad was unable to handle it. As a result of the unusual demand for transportation and the urgent insistence and pressure by shippers and governmental agencies, that the railroad fully meet its obligation as a common carrier in the territory served by it, the management decided to complete as promptly as possible the double tracking program, build larger and additional terminals, purchase new equipment, and increase the facilities generally. To finance those improvements the $45,000,000 first and refunding bonds were issued at a time when the then present and prospective demand for transportation facilities justified it and the earnings were ample to take care of not only existing fixed charges but also interest on the new financing.

"The present unfortunate situation is due to the culmination of several happenings, all of which in a great measure affected the business of our road and reduced its income. First came the collapse of the real estate boom. Later came the Mediterranean fruit fly quarantine, lasting more than a year, during which time only small quantities of citrus fruits and vegetables were shipped out of the state, and then came the world-wide depression affecting every line of business.

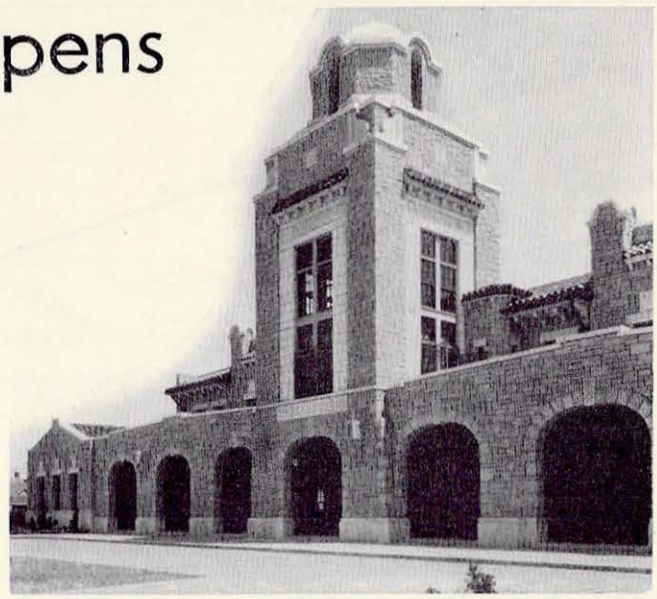
"In addition to the above, the extension of the Seaboard Air Line to West Palm Beach and paralleling of our road from that point to Homestead, under authority of the Interstate Commerce Commission, affected our business seriously and resulted in great loss of revenues, there not being sufficient business in the territory for the two roads.

"Also, the deepening and developing of the harbor of Miami by the United States Government and the heavy decrease of business resulting from water competition of fast steamships to that port, built largely with money loaned by the United States Shipping Board, proved to be one of our greatest sources of loss of revenue. The seriousness of this competition will be appreciated when it is borne in mind that coastwise water carriers are un-

(Continued on page 370)

Oklahoma City Opens New Station

Project includes seven miles of new line, the abandonment of the Rock Island's main tracks in the business district and two grade separations



The Structure Is of Unusual Design

ON July 15, the St. Louis-San Francisco and the Chicago, Rock Island & Pacific opened a jointly-owned passenger station at Oklahoma City, Okla., which replaces the independent facilities of the Rock Island and gives the Frisco, which has heretofore used the Atchison, Topeka & Santa Fe station, passenger facilities on its own line. As a part of the general plan, the Rock Island constructed a new main line seven miles long, of which four and a half miles is double track, on a diverted alinement to reach the new station which is located on the Frisco main line, and abandoned its former passenger station and its main tracks through the business district of the city. Likewise, the Frisco abandoned its freight house and the tracks serving this facility, which were also in the business section.

As a part of the construction, two subways were built to eliminate grade crossings at Robinson and Walker avenues, respectively one block east and one block west of the station, both of which are important traffic arteries. The magnitude of the project is indicated by the fact that the total cost was $4,625,000 divided between station and subways, $2,500,000, and the Rock Island diversion $2,125,000.

Oklahoma City, in common with other communities in this fast growing commonwealth, has had a constant and rapid increase in population. In the 40 years of its existence, it has attained a population of 180,000, a large part of this growth having occurred in the last decade as a result of the discovery of oil in quantity on the outskirts of the town.

Traffic and Crossing Problems Increase

This rapid growth has made necessary constant revisions of and additions to the facilities of the railways serving the city. Furthermore, to a greater extent than in more settled communities, traffic problems became difficult of solution because of the rapidly changing conditions of population and business. The main line of the Rock Island passed from east to west through the center of the business district, with its tracks at street grade. As a result, there had been an insistent agitation in recent years for a complete elimination of the grade crossings in this district. Owing to the fact, however, that the property on both sides of the railway had been developed intensively by industries and that numerous industrial tracks had been constructed to serve them, no solution of the problem seemed practicable.

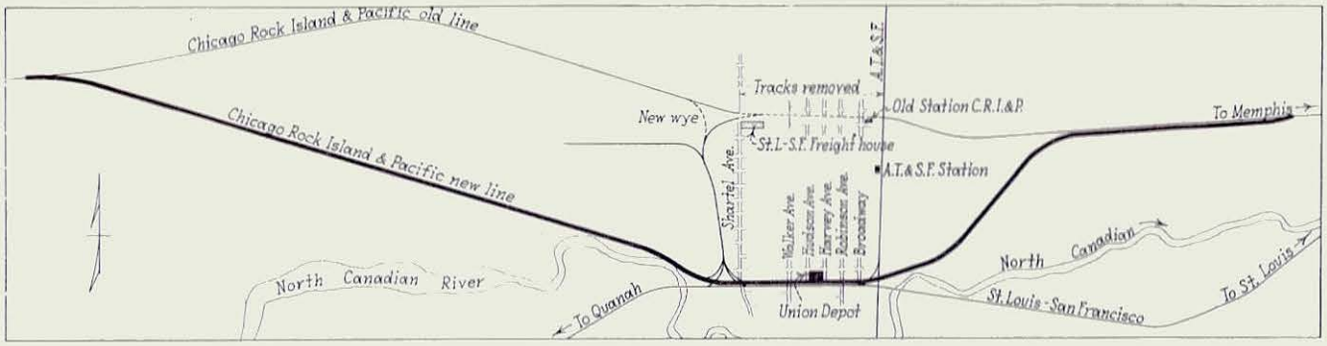
On the other hand, the Frisco practically paralleled the Rock Island, but enters the city more than three-fourths of a mile to the south, thus avoiding the business district. While this road has always maintained its own freight facilities, it has heretofore used the passenger facilities of the Atchison, Topeka & Santa Fe, which are located about three blocks south of the former Rock Island station.

Rock Island and Frisco Abandon Facilities

Extended negotiations between the city and the railways for relief from the grade crossing situation finally resulted in an agreement with the Rock Island and Frisco whereby the former has abandoned its station and its trackage between the Santa Fe crossing and Shartel avenue and joined in the construction of a passenger station on the line of the latter road. This agreement included the closing of Harvey avenue across the Frisco right of way and the construction of subways at Robinson and Walker avenues to eliminate the grade crossings of these streets with the Frisco. On its part, the Santa Fe, which runs north and south through the city, and which is located about one block east of the former Rock Island station, is elevating its tracks for the purpose of eliminating the grade crossings on its line.

Owing to the abandonment of its line and the necessity of reaching the new station, the Rock Island constructed a new line seven miles long, of which 4.5 miles is double track. The diverted line begins 1.5 miles east of the former crossing with the Santa Fe and follows a southwesterly direction until it reaches the Frisco at Broadway. It then parallels the Frisco right of way to a point west of Shartel avenue, where it turns to the northwest and follows the North Canadian river to a junction with the old line 5.25 miles west of the Santa Fe crossing.

Beginning just west of Shartel avenue, the Frisco has an industrial lead which extends north and which was also used to reach its freight house, this facility having been located about two blocks east of Shartel avenue and immediately south of the Rock Island tracks. The agreement with the city required the abandonment of this freight house and the removal of all tracks east of Shartel avenue, but did not affect the industrial connections, which are west of that street. To facilitate access to the industries on its line west of the business district, the Rock Island has constructed a wye connection between this lead and its former



Tracks Abandoned and New Line Constructed by the Chicago, Rock Island & Pacific

main tracks and will use it as a short route for switching and transfer trains.

Design of Station Is Unusual

The new passenger station occupies the entire block between Harvey and Hudson avenues, facing Choctaw avenue on the north. It consists of an assembly of buildings, the central unit of which comprises separate waiting rooms for the two races and facilities for the

Treatment of Waiting Room Gives Venetian Effect

comfort and convenience of passengers. To the south, on either side of this unit and connecting directly with it, are the mail and baggage building on the west and the express building on the east, both of which are accessible from the street. Directly south of this group are the passenger tracks and platforms, each of the latter being protected by the Frisco butterfly type of platform shelter. Immediately south of the tracks is a power plant for heating the buildings and such cars as are set out at the station.

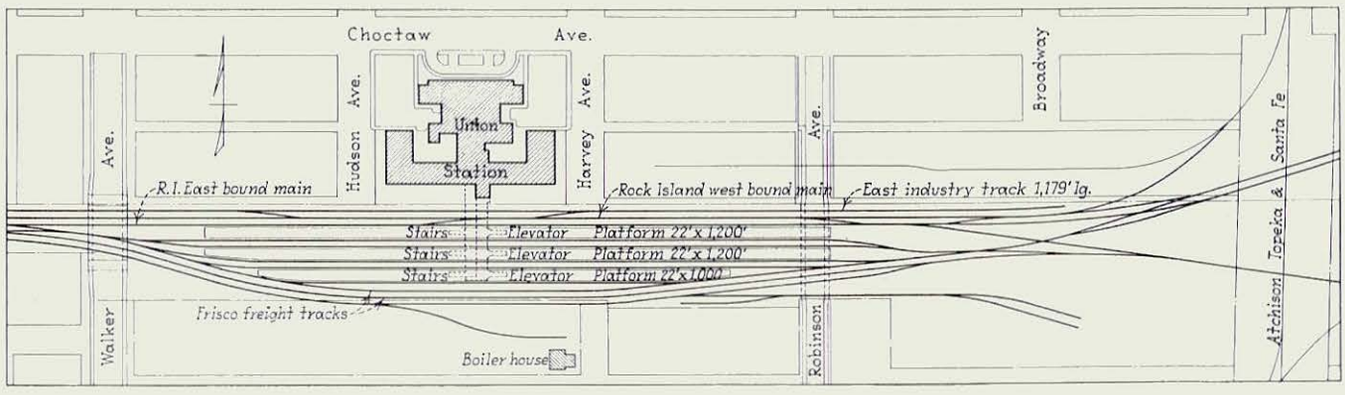
In designing the facility as a whole, a distinct historical treatment has been attempted, although the facade embodies more of a modern motif, with a view of expressing the purpose for which the structure is intended. While historical forms were abandoned in the facade, many of their details and ornaments were used, modified by modern influence and selection, with the purpose of creating a new method of expressing their functions.

Fireproof construction is used throughout. The walls of the several units are constructed of either reinforced concrete, brick or tile, but, to harmonize with other features of the design, the exterior is finished with quarry-faced broken-ashlar limestone from Phoenix, Mo. The roof of the central unit is supported on steel trusses with precast reinforced concrete slabs, which are waterproofed with tar and roofing paper, to carry the variegated tile roofing. The precast slabs which form the roof of the remaining units are supported on I-beams and are protected with tar and gravel roofing.

Deep Loggia Forms Main Entrance

Extending across the north or Choctaw Avenue front, and approached by a circular concrete driveway which is embellished with a fountain set in a spacious lawn, is a deep loggia with a heavy beamed ceiling and quarry tile floor, forming the main entrance, which is reached through massive stone arches. Surmounting the loggia at the center of the facade is a lofty decorated tower which lends a stately appearance to this central unit. Access to the station is also provided from both the Harvey and Hudson Avenue sides of the building.

From the loggia, one enters, on the left, the general waiting room, and on the right, the waiting room for colored passengers. Adjacent to each are women's rest and toilet rooms and smoking and toilet rooms for men. Owing to climatic conditions, all rooms are provided

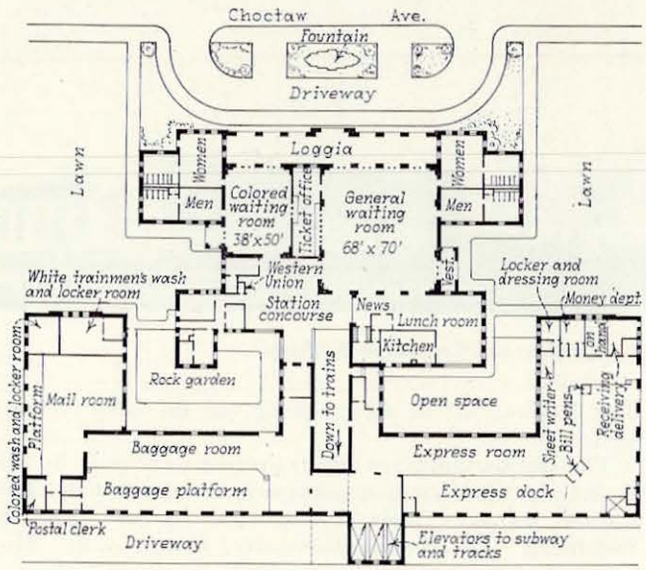


Station and Trainshed Layouts

with high ceilings, thus permitting massive treatment in Venetian and travertine effects. The respective waiting rooms are finished with dado courses of polished marble and of tile, the general waiting room also having engaged marble columns and a heavy beamed ceiling with bas-relief ornamentation. The color scheme produces a harmonious blend with the colored marbleoid floor which is laid out in attractive design.

While the central section of this unit has a height equal to that of a two-story building, the entire overhead space is occupied by the waiting rooms, so that there are no second-floor offices and no facilities save those that are required for the convenience of passengers. The tower was also added purely for architectural effect and serves no other purpose.

Located between the two waiting rooms, providing easy access from both, is the ticket office. Between the waiting rooms and the exit to trains is a spacious concourse, finished to correspond with the waiting rooms, from which access is gained by all passengers to the news stand, parcel room, baggage room, telegraph office, public telephones and travelers' aid. A short passage from the concourse leads to the offices of the station master, the passenger agents and the railway telegraph office, while a side entrance to these offices is provided as a convenience for trainmen. Trainmen's wash and locker rooms, separate for white and colored employees, are located at the north end of the mail and baggage building. The lunch room is reached only through the general waiting room.



Floor Plan of Station

Elevated platforms are provided in the mail, baggage and express rooms for the convenient handling of these deliveries, those in the baggage and express rooms being equipped with platform scales having weightograph attachments for rapid weighing. Concrete driveways on the east, south and west surround the wings in which these facilities are located, the south drive affording a connecting link between Harvey and Hudson avenues.

In addition to a series of walks surrounding the premises, the grounds have been given landscape treatment with evergreen shrubs and spacious lawns into which beds of variegated plants have been introduced with pleasing effect. Between the central unit and the west wing, where it is directly visible from the concourse, is a sunken rock garden containing a water basin and rare plants.

The Loggia Is Deep and Wide

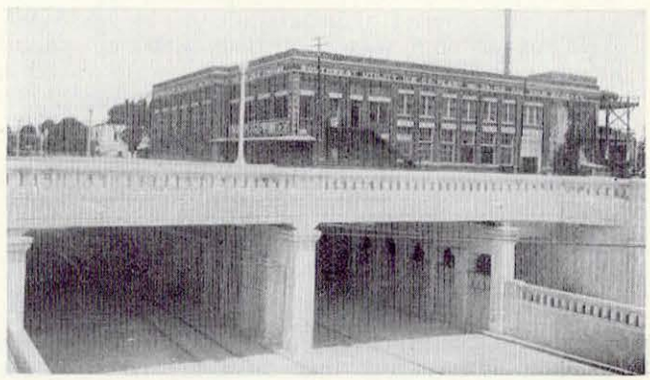
Passengers reach the trainshed by means of a ramp and subway which lead from the station concourse and pass under part of the baggage and mail rooms and the tracks, with short flights of easy stairs to each of the platforms, which are at waiting-room level. The trainshed contains five independent passenger tracks and three platforms, all of which are 22 feet wide, the northerly two being 1,200 ft. long, while the third has a length of 1,000 ft. The platforms are of concrete and are protected by butterfly-type shelters, which are constructed of structural steel columns to support tar-and-gravel roofs laid on wood sheathing.

East of the passenger subway and separated from it by a concrete partition wall, is a trucking subway extending to the trainshed. At its north end, it is connected to the baggage, mail and express rooms by a bank of three elevators, and corresponding elevators are located at each of the three passenger platforms to raise the trucks to the trainshed level. All tracks are carried across these subways on reinforced concrete slabs.

Complete segregation of passenger and freight movements is provided in the station layout. The two freight tracks of the Frisco swing to the south to pass around the station tracks, while those of the Rock Island are located on the north between the trainshed and the station. The north passenger platform is adjacent to the Rock Island's eastbound freight track, however, which can thus be used as a station track when occasion demands. The freight main tracks are owned independently by the two roads, all other tracks in the station area are owned jointly, and all tracks were built new as a part of the station project.

Two Important Subways Are Constructed

All north and south streets within the station limits were closed except Robinson and Walker avenues, so that it was impracticable to prosecute the construction of the subways at both of these streets simultaneously.



The Subway at Walker Avenue Is Pleasing Architecturally

Because street cars are operated on Walker avenue, this street was chosen for completion before the station was opened, to avoid inconvenience during construction to such passengers as desired to use the street cars.

It was necessary to avoid interruption to the street-car service, which extends to that section of the city which lies beyond the river south and west of the station. To do this, the subway was built in two longitudinal sections, the grade being lowered and the work completed on the west half first, after which the east half was completed.

Owing to the fact that the tracks at this crossing are only slightly above the ground level, it was necessary to excavate to a depth substantially below the normal stage of the North Canadian river and to raise the ends of the subway approaches slightly to bring them above high-water level. For this reason, the backs of all retaining walls are waterproofed with asphalt paint, 18,200 sq. ft. having been applied, while 13,500 sq. ft. of membrane waterproofing, protected with asphalt plank, was used on the bridge deck.

In addition to these precautions, duplicate 1,200 g.p.m. electrically-driven centrifugal pumps, automatically controlled by float switches, were installed and the space under the sidewalks is designed to serve as a temporary storage for floodwater in case of need, until it can be removed by the pumps.

To provide an outlet for certain industries fronting on the approaches, marginal roadways are provided at the original street grade, and these roadways on each side of the tracks are cross-connected by drives which are supported by extending the track slabs on both the north and south sides of the bridge structure. As indicated in the illustration, special attention has been given to the architectural features of the design to produce a structure of exceptionally pleasing appearance.

As an indication of the magnitude of this job, 37,000 cu. yd. of material was excavated; 5,800 cu. yd. of concrete and 573,000 lb. of reinforcing were placed in the retaining walls and bridge substructure; 25,000 lin. ft. of piling was driven in the foundations and 28,000 sq. ft. of interlocked steel sheet piling, 5,000 sq. ft. of which was left in place, was used to retain the slopes during construction; 300 tons of 24-in., 140-lb. I-beams were required in the bridge slabs; 2,400 lin. ft. of balustrade was constructed; and 9,000 sq. yd. of concrete paving was laid.

Robinson Avenue subway, which is now under construction, will be practically a duplicate of the one on Walker avenue, except that there are no street-car tracks, while a larger number of railway tracks cross this street. Rather severe construction conditions have been encountered at both streets, owing to the presence of considerable quantities of quicksand. Walker Avenue subway cost $262,000 and the subway at Robinson avenue is expected to cost $288,000.

Plans and specifications for the station development were prepared in the office of Col. F. G. Jonah, chief engineer, St. Louis-San Francisco, and the entire project was carried out under his direction. R. C. Stephens, architect, designed the station and its appurtenant structures and supervised their construction. H. E. Bailey, resident engineer, was in direct charge of the field work. The Rock Island's new line and the two subways were planned and constructed under the general direction of W. H. Petersen, chief engineer of that line, and H. T. Livingston, engineer of construction. The subways were designed by I. L. Simmons, bridge engineer, and were constructed under his supervision. W. A. Wallace, resident engineer, was in direct charge of the new line, while Hans Bober, resident engineer, is in direct charge of the subway construction.

The Station Comprises an Assemblage of Independent but Connected Buildings

The station buildings and trainshed were built by the Tankersley Construction Company, Oklahoma City. The station subways were constructed by the List & Weatherly Construction Company, Kansas City, Mo. The concrete platforms were built by Reid & Lowe, Birmingham, Ala. Earl W. Baker & Co., Oklahoma City, did all the grading and street paving in connection with the station. T. E. Wiggins, Oklahoma City, did the grading for the Rock Island's new line and John W. Fox, El Reno, Okla., was the contractor for the Robinson and Walker Avenue subways.

* * *

A Train of Live Poultry on the Indiana Harbor Belt

Western Rate Hearings Conclude Testimony

Chicago session includes presentation of evidence and cross-examination of railroad witnesses

THE hearing on the application of the railroads for an increase of 15 per cent in freight rates, held at Chicago on August 31 to September 5, concludes the taking of testimony by the commission, following the hearings at Portland, Maine; Washington, D. C.; Dallas, Tex.; Atlanta, Ga.; Kansas City, Mo.; Portland, Ore.; San Francisco, Cal., and Salt Lake City, Utah. Final arguments will be presented at Washington on September 21 and the commission is expected to render its decision in October.

Because of the large amount of testimony presented at Chicago, the hearing was divided into two parts, which ran concurrently. Hearing A, over which Commissioners E. I. Lewis and William E. Lee presided, included the cross-examination of the witnesses who were presented by the carriers and financial interests at the Washington hearing; testimony of State Commissions; evidence of agricultural, fruit growing, livestock, poultry and dairy interests; testimony of canned goods, packing house products and strawboard interests and evidence of chambers of commerce and other commercial organizations. Hearing B, over which Commissioners B. H. Meyer and Claude R. Porter presided, included the testimony of various industries and commercial interests that individually did not require a large amount of time and evidence as to non-ferrous metals, lumber, coal, tile, sugar and other commodities. With the commissioners were H. A. Hannah, chairman of the Railroad and Public Utilities Commission of Tennessee, Paul A. Walker, chairman of the Oklahoma Corporation Commission, A. R. McDonald of the Public Service Commission of Wisconsin and Hugh White, president of the Alabama Public Service Commission.

On the first day of the hearing, Julius H. Parmelee, director of the Bureau of Railway Economics, supplemented previous exhibits showing the rate of return on property investment, gross expenditures for additions and betterments, railway revenues and expenses and the estimated return and number of times fixed charges would be earned during 1931 if freight revenues were increased 15 per cent, by basing the new exhibits on a six-month period instead of the four-month period upon which the exhibits submitted at Washington were based. He was cross-examined by Luther M. Walter, commerce counsel of the National Industrial Traffic League, who asked for individual figures showing the estimated return per railroad. Mr. Walter's questions were designed to develop the practicability of the pooling of railroad earnings.

Among others who were cross-examined were J. J. Pelley, president of the New York, New Haven & Hartford, H. A. Scandrett, president of the Chicago, Milwaukee, St. Paul & Pacific and Fairman R. Dick of the Security Holders' Committee on Railroad Emergency. Cross-examination was conducted by Senator Smith W. Brookhart of Iowa and R. C. Fullbright and Luther M. Walter, counsel for the National Industrial Traffic League. The major portion of the cross-examination was designed to show that if the railroads pooled their earnings so that the weak lines received a portion which would make them stronger, a 15 per cent increase would not be necessary. Other questions asked dealt with the effect of railroad rates on commodity prices and adjustments and changes in the division of rates among the carriers.

During the cross-examination of Mr. Pelley, Mr. Walter endeavored to show that all of the railroads do not need the increase and that by pooling an increase those that need more money will benefit and the shippers, as a whole, could be saved between $200,000,000 and $300,000,000. In answer to this suggestion, Mr. Pelley said he did not believe that such a plan is fair and equitable and that it was one which no one can force upon the railroads. He also said that it would be impossible to find out what the net of an increase would be, since operating expenses will increase and freight rates on materials bought by the railroads will be higher. Mr. Walter then asked Mr. Pelley to assume that the commission would agree to the increase only on the condition that the increase be pooled and the earnings above a certain amount be given to the weaker railroads and asked whether the railroads would then agree to pool their earnings. Mr. Pelley said the railroads would not assent.

In cross-questioning Mr. Pelley, Senator Brookhart attempted to bring out an admission that an upward revision of freight rates on commodities would create a decrease in commodity prices such as grain. Mr. Pelley denied this, saying that grain prices are controlled by the law of supply and demand. The senator countered with the statement that earnings on agricultural operations are usually limited to four per cent on the investment and suggested that the return on railroad investments be limited to a similar rate.

Commissioner Lewis put several questions to Messrs. Pelley and Scandrett regarding the prospects of an increased diversion of traffic to water routes, long-haul trucking and coast-wise shipping, as well as rivers. Both executives thought that despite this competition, the railroads would gain a great deal in revenue through the increased rates. Mr. Scandrett said that if these rates are harmful to the shippers, they will be adjusted as soon as possible.

Fairman R. Dick, partner in the firm of Roosevelt & Sons, appearing as a witness for the Security Holders' Committee on the Railroad Emergency, submitted exhibits dealing with the decline in the market value of railroad refunding and overlying bonds; an estimate of earnings to show by what amount they will exceed or fall below one and one-half times the fixed charges; and a table comparing the revenue per ton mile with commodity figures from 1890 to 1931. In his testimony on bonds, he showed that 56 legal and non-legal refunding and overlying bonds suffered an average drop of

17.60 points from the high point in 1930 to June 1, 1931, and 28.50 points from the high point in 1930 to August 24, 1931. He said that the railroad bond situation has become worse since the Washington hearing and that bonds have declined as much as German bonds.

In testifying on estimated earnings for 1931, he said that the indicated net railway operating income for that year will be $555,923,000, which, with a non-operating estimated income of $253,848,000, would give $809,771,000 available for fixed charges, which he estimated would amount to $599,725,000. He said that the estimated earnings will amount to only 1.35 times the fixed charges.

In his study of revenue per ton mile and commodity prices, he showed that the revenue per ton mile decreased from 0.941 cents in 1890 to 0.719 cents in 1916 and then increased to 1.063 cents in 1930. At the same time, the prices of all commodities, based on a wholesale price index of 100 for 1926, amounted to 56.02 cents in 1890, 85.05 cents in 1916 and 86.03 in 1930, while the prices of farm products followed a similar trend, amounting to 50.04 cents in 1890, 84.04 cents in 1916 and 88.03 cents in 1930. He stated that there is no relationship between the revenue per ton mile and commodity prices but that if railroad rates had increased in the same proportion as commodity prices during 1917, 1918, 1919 and 1920, the railroads would have received an additional $21,000,000,000 in revenue during the 4 years.

During cross-examination by Ex-governor Reed of Kansas, Mr. Dick stated that the prices of securities fluctuated according to the credit of the company and that in his tabulation of bond prices, there were only three railroads that had not lost credit sufficient to affect their bond prices since 1920. These include the Atchison, Topeka & Santa Fe, the Union Pacific and the Norfolk & Western. Mr. Walter, in cross-examining, asked why the Santa Fe bond was used as a yardstick and Mr. Dick explained that he could not use municipal bonds because the surtax in 1920 was 60 per cent and could not use United States Government bonds because those issued in 1920 were short-termed. Additional cross-examination consisted in queries as to the restrictions of insurance companies upon bonds, the requirements of the New York superintendent of savings banks and whether the New York Savings Bank statute operates to require the sale of securities which have become non-legal following purchase.

Salt Lake Rate Hearings

Livestock and mining interests appeared before Commissioners E. I. Lewis and W. E. Lee at Salt Lake City, Utah, on August 24-29, to oppose the railroads' proposal for a flat 15 per cent increase in freight rates. Sitting with the commissioners were J. M. Thompson, representing the Idaho Public Utilities Commission and W. J. Carr, appearing for the California Railroad Commission. Charles E. Blaine, counsel for the National Livestock Association, recommended economies in operation, including the curtailment of passenger train service, the elimination of round-about hauls, and the reduction of railroad staffs of high-salaried officers, as a means of lowering the cost of service. In his testimony, he referred to the small number of persons carried in certain trains.

Mr. Blaine also suggested a reduction in the number of agents in the field, soliciting traffic in territories not directly served by their lines and the elimination of the routing of freight over indirect routes to permit certain railroads to share the freight earnings, or to keep some competitor from sharing in it, advocating that when a shipper specified a long-haul route, he should be made to pay higher freight charges. He also submitted statistics to show that, including animals and their products, the products of agriculture originated only 10.76 per cent of the total tonnage handled by Class I steam railroads in the United States, but paid 21.51 per cent of the total carload freight revenue in 1929. Livestock, he said, originated 1.13 per cent of the revenue freight on these lines, and paid 2.18 per cent of the total carload freight revenue.

F. A. Silver, secretary of the Board of Railroad Commissioners and Public Service Commission of Montana, submitted figures to show that 69 per cent of the state had been affected by the drought. He also said that the railroads were already helping by reduced rates on feed for livestock and that an increase in rates would work a hardship.

F. A. Sturm, representing the Montana Coal Operators' Association and the Anaconda Copper Company, and others, testified that Montana coal was having a difficult time competing with natural gas and should not be burdened further.

F. O. Sandstrom, secretary and traffic manager of the Colorado-New Mexico Coal Operators' Association, also recited natural gas competition difficulties. He also claimed that the increase would destroy the balance now existing between Castlegate, Utah, and Walsenburg, Colo., coal. F. E. Molin, secretary of the National Livestock Association, testified that trucks are making serious inroads on railroad livestock business for hauls under 300 miles, sometimes reaching 500 miles.

A. G. McKenzie, secretary of the Utah chapter of the American Mining Congress, testified that only 2 furnaces out of 26 in the smelters in Utah are now running, that 60 per cent of the persons ordinarily employed by the mining industry direct are laid off and that most of the work being done by the mines now is done because the owners feel a community responsibility to keep some kind of payroll alive. He asserted that the proposed raise of 15 per cent would only tend toward further curtailment, that the railroads would lose more time and more men would be added to the unemployment list in Utah, where metal mining supplies a livelihood for 47 per cent of the people, agriculture 17 per cent, transportation 14 per cent and manufacturing, coal mining and distribution the balance.

M. H. Greene, representing the Idaho Public Utilities Commission, entered a motion that the carriers' petition be dismissed. J. W. Wester, president of the Intermountain Grain Growers' Association, declared that the dry-land wheat farmers in some instances were considering turning the crops into grazing.

J. S. Early, secretary of the Utah Shippers' Traffic Association, presented a series of exhibits to show that the proposed increase would greatly embarrass Utah mines and factories. One exhibit showed that certain commodities, such as sheet iron, could be shipped from Canton, Ohio, to San Francisco or Los Angeles, for the same amount charged for a shipment to Salt Lake City, although the coast cities are 800 miles away. He said that condensed milk factories in northern Utah and southern Idaho would be forced to carry an added burden of $35,000.

Kansas City Hearing

The hearing at Kansas City was conducted by Commissioners Joseph B. Eastman and Claude R. Porter from August 26-30. Several night sessions were held. The bulk of the testimony presented by the interests

(Continued on page 373)

Cabins with Kitchenettes Are Provided at the Pacific Electric Vacation Camp

Pacific Electric Sponsors Education Among Employees

More efficient workers developed as a result of increased learning and healthful recreation

THE Pacific Electric, realizing the importance of adult employee education, has fostered this activity with such success that at the present time it conducts classes for 600 employees and members of their families. In 1924, the company engaged an educational director to assist employees in taking advantage of the study opportunities offered in the several public evening high schools, but the subjects given in the city schools did not meet all the requirements of electric railway employees and to correct this situation, special classes were organized, the first having been one in purchasing and stores department procedure. The class was continued for five months with 50 employees enrolled and attending. The results obtained by conducting this course revealed the advisability of offering additional courses.

Through the co-operation of the Los Angeles Board of Education, the Pacific Electric secured the service of qualified instructors to conduct the various courses of study. Under the agreement between the railroad and the board of education, the instructors are furnished and paid by the latter and the Pacific Electric becomes a unit of, although operated independently, the city's adult education department. Regular high school credits are given to students working for a high school diploma and arrangements exist for the issuance of joint certificates for the successful completion of courses of study.

In September, 1929, the Pacific Electric, at a cost of some $450,000, completed the erection of and opened to its employees one of the most, if not the most, elaborate club buildings in the United States for railway employees. This building, in addition to containing the many and diversified features of a modern club, has three classrooms designed and equipped especially for educational work. There are also a ballroom and a large auditorium which are used by the educational department and for other activities.

New courses of study have been added to the curriculum each term, the selection of which has been left to the employees, in that new studies are only added upon the request of 15 or more employees who indicate their desire to take such a course. When a new class is to be added, the educational director of the company makes a request on the board of education through its adult education department for an instructor to conduct the course requested.

At present 24 classes are organized and 15 teachers are on duty, with an enrollment of approximately 600 employees and members of their families. Each class elects its own officers and the presidents of the classes form a school council, holding their meeting once each week. The council is responsible for all school activities, outside of the class work, and arranges for all school entertainments, banquets and picnics, as well as for commencement exercises given at the close of each semester.

Schedules of classes are distributed throughout the system and officers of the company co-operate at all times in urging all employees of their respective departments to enroll in one or more of the classes offered. Where employees living in outlying districts find it inconvenient to attend the Pacific Electric school, arrangements are made for them to enter a city school more conveniently located. Close contact is maintained to determine the progress being made by the employee-student in an outside school and credit is given by the

Pacific Electric school for his successful completion of courses of study.

Diploma certificates for the successful completion of prescribed courses of study are issued jointly at the end of each semester by the Los Angeles board of education and the Pacific Electric, and are signed by the educational director, the president of the Pacific Electric club and the president of the Pacific Electric.

The schedule of courses offered for the term which commenced on February 3, 1930, included art decoration, airbrake instruction, automotive theory, business and transportation law, dancing, dramatic art, English grammar, engineering electricity, engineering mathematics, letter writing, music, personal leadership, physical culture, psychology, slide rule, social psychology, Spanish, stenography, traffic management, typewriting, and voice and speech improvement.

The Pacific Electric has just turned over to its workers in Los Angeles a club building and appurtenances that are unusual in their attractiveness. In its entirety the building is dedicated to the employees that they may find therein and thereby comfort, pleasure and educational opportunity.

The club building, a four-story concrete structure, adjoins the Main street station of the Pacific Electric and faces on Los Angeles street, being erected on a lot 60 ft. by 140 ft. On Los Angeles street is a motion picture theatre which seats 712 persons. A show is given here weekly, a movie of good quality and reputation, and no admission charge is made to members of the club and their dependents.

On the second floor a dining room is provided where foods are served at prices well within the range of all railway workers. Some 400 persons patronize the restaurant daily.

The main lounge is on the third floor, and adjoining it is a billiard parlor with three pool tables and one billiard table. A circulating library, stocked with books and current magazines, also adjoins the main lounge, as does a card room fitted with five tables.

On the fourth and top floor of the building is located the ballroom. Weekly dances and special gatherings are held, no charge being made to employees, their family members and friends. An employee orchestra provides music.

The Pacific Electric Employees' Club was organized in 1916 with the approval and encouragement of the then president, Paul Shoup. Under succeeding executives, the club has continued to function and during the regime of President Pontius the scope of its activities has been gradually broadened.

The club now has approximately 4,800 members who contribute 35 cents monthly, which entitles them and their dependent family members to all pleasures and privileges. The revenue thus derived practically meets the current expenses of operation and entertainment. The management assumed the cost of construction and contributes from time to time in the club's proper perpetuation.

In addition to the club, the Pacific Electric maintains a mountain vacation home in the San Bernardino mountains near Lake Arrowhead, where, at prices far below those elsewhere obtainable, the railway worker and his family may enjoy a summer outing. Many free vacation diversions are offered the vacationist on the wooded site where 1,500 persons last year enjoyed rest and relaxation. Improvements of the most modern type have been made in this camp and it now represents an investment of $118,000.

A Mathematics Class in Session

Reading Testimony on Traffic and Purchases

(Continued from page 356)

order by a given date. Mr. Landis said that no orders were placed by the date specified but that the company was given some business a little later. Asked if the traffic department had not tried to induce the purchasing department not to buy from coal brokers because they did not control the routing, Mr. Landis replied in the negative, saying that it was sometimes necessary to buy from brokers to obtain a supply of coal. Other letters referring to the purchase and routing of cement were read and Mr. Landis said the traffic department often repeated to the purchasing department the arguments put up by shippers in seeking to sell to the railroad.

Mr. Hilleary was also questioned about many letters in which shippers complained because they had not been given sufficiently large orders and threatened to divert their tonnage. He said that many such letters merely represented zeal and that in the case of some of them statements in the letters were jocular and should be discounted because of the intimate personal relations between the writers and recipients of the correspondence. Mr. List seemed to be not entirely satisfied with this explanation as to a series of letters from F. E. Paulson, traffic manager of the Lehigh Portland Cement Company to Mr. Hilleary, which he said repeatedly threatened diversion, but Mr. Hilleary said that the writer was a man who was "on the job all the time" but that he had never diverted a pound of cement and that he knew he was getting his fair share of the business. He said he did not recall a single case in which he had told the purchasing department to place an order because of threatened diversion of traffic. When Mr. Bartel asked why so large a share of the correspondence about purchases was with the traffic department he said it seemed to be a "trade practice" but that he did not think it affected the distribution of business much.

Referring to some letters in which traffic solicitors had spoken of bringing "pressure" to bear to induce the routing of tonnage, Mr. List asked if this meant threats of reprisals. Mr. Hilleary said that any one in his department who attempted to use such a policy would be made so uncomfortable that he would not repeat it and he excused some letters in which traffic solicitors told shippers that they had "induced" the traffic department to place certain orders as representing "salesmen's arguments."

Hidden Costs of Company Material

Opportunities for economies in reducing surplus stocks, shortages and excessive handling and other waste discussed

By C. I. Cavenaugh

Division Storekeeper,
Atlantic Coast Line,
Tampa, Fla.

Freight Car Material on the Atlantic Coast Line

WHAT does it cost a railroad to have material and supplies on hand when it needs them? The answer to this question embraces much beyond the original cost of the material, the freight, handling and interest charges. The usual procedure in computing the cost of handling supplies on a railroad is to determine the relation between the known expenses and the value of material used. The figure developed is generally accepted as the cost of handling per thousand dollars of material used. But what about the hidden costs, the intangible sources of expense that are not readily seen, the leaks, the costs that cannot be computed?

Perhaps the most deplorable of losses to a railroad company connected with the handling of material and supplies is the cost of surplus and obsolete material, and the cost of handling it. The responsibility for accumulation of surplus is widespread among various persons authorized to request the purchase of materials for immediate use or for stock for future requirement.

Storekeepers and others are sometimes overzealous in protecting against a shortage of an item. They over-order and the surplus which develops is difficult to absorb. Overstocking of material which is used regularly is least difficult to cure. Except for the possibility of obsolescence, the surplus of such material may cause no extra expense beyond an investment for a longer period than necessary. However, when mistakes are made and faulty judgment or carelessness causes the purchase of material that is not needed, or when obsolescence overtakes stock on hand, the result is a dead loss. Often the responsible party is tempted to hide the error to avoid censure. Obviously this is the wrong course. It might be possible to return the purchase for exchange. The transportation and handling are even then a net loss, but the value of the shipment is recovered. If the return of the material is not permissible, the proper time to find the next best disposition is immediately after the receipt of such material.

Better Planning of Construction Work

Construction and other additions and betterment work are often causes of surplus and obsolete material. Plans are changed, requiring different material than was purchased, or less of it. Sometimes more material is purchased than is needed, and the longer it remains in stock, the more it costs.

Watching the Drives

Spasmodic and periodic demand for material also incite over-ordering and result in excessive stocks. These are usually the result of special campaigns, special programs of repair work, or seasonal fluctuations in operating conditions. Often an engine failure or a train delay following a breakage of some part will start an intense campaign of inspection, resulting in the use of an abnormal quantity of material. Stocks will be built up to the increased demand and suddenly the demand will slack off, causing a surplus.

The maintenance of new types of equipment and appliances is accompanied by the danger of getting too much material. New types of injectors, lubricators, stokers, etc., are constantly being put into service. To determine the proper stock of repair parts to protect them presents a problem. Sometimes recommendations of the manufacturers' service engineers are accepted and sometimes the mechanic in charge of the repair work is allowed to say what he needs. Usually parts are ordered that seldom wear out or break in service and years later these parts become surplus with the storekeeper.

Orders for special material and parts that are not regularly stocked often reach a storekeeper with the proper approval and the purchases are made. It is not

* From a paper entered in the contest conducted by Division VI, A. R. A.

difficult for the person originating such an order to overestimate the quantity he will need, or to include items he does not require. Sometimes this is done purposely, the order maker having in mind using the material on work which he doesn't want known. Sometimes it is merely the result of carelessness. When the material is received and delivered, some of it is left over and it is stored out of sight, either for future use or to hide the carelessness. Eventually it finds its way back to the store-room or to the scrap pile. The amount of surplus or dead stock that accumulates in this manner is considerable.

Constant changes made to improve equipment and operating conditions are made at the price of some obsolescence. The problem is to keep material from becoming obsolete as far as possible by considering the stock on hand. But once an item becomes obsolete, the next best thing is to get rid of it. If it cannot be substituted for something else by alteration or otherwise, or if it cannot be sold as usable material, it should be sold for scrap.

Complete control over stock by regular physical checks is the best known method of preventing over-ordering. To uncover errors of judgment and carelessness and to bring each case to the attention of the proper supervising officer is the secret of avoiding recurrence of such errors. Careful checking of requisitions and close co-operation between the supply departments and using departments will also keep down the accumulation of surplus and obsolete material.

The Cost of Shortages

The cost of material shortages is also to be considered. Delay to shop schedules slows up production and ties up valuable equipment. Time and labor are wasted "swapping" parts from one piece of equipment to another. Labor and material are wasted making substitutions, not to mention the unsatisfactory job often turned out. Shop manufacturing at a loss is indulged in as a result and there is also the expense of special handling and tracing, telegraphing, express charges, premium prices, etc.

Some authorities think that the cost of tieing up equipment may be gaged by the amount of interest which accrues against the value of the equipment. The value of the space in the shop occupied during the delay may also be considered. There seems to be no formula known for determining the cost of lowered morale among the shop forces due to material shortage, but the storekeeper who has borne the brunt of their criticisms knows that this is not the least of the ills resulting from cutting stock too close to the danger line.

Shopmen are interested in output and when delay is threatened by lack of material they are going to do what they think is next best,—find a substitute even at the cost of alteration or else rob some other piece of equipment. Either course is expensive. Shop manufacturing, except on a quantity basis, is nearly always unprofitable. Yet, much of this results from not having the right material when needed.

Every purchasing and material-handling organization spends considerable money tracing orders, expediting shipments, and otherwise giving special handling to items urgently needed. Telegraph bills are incurred, express charges are paid on shipments that would have moved more cheaply by freight, and premium prices are sometimes paid because of impending shortages.

The reasons for material shortages are largely identical with the causes of surplus material. Spasmodic demand, unusual bunching of equipment, special campaigns or programs, anything that creates an extraordinary demand, are causes. In attacking these to keep down surplus we also solve to a large extent the problem of material shortage. The ordinary remedy lies in regularity in checking and replenishing stock, and co-operation between the supply departments and users.

Excessive Transportation Costs

It is doubtful if the full significance of transportation charges is realized. How many realize that one-tenth of all the freight tonnage handled by the railroads of this country is non-revenue business, which consists almost entirely of materials and supplies? We read that in 1929 *(Railway Age)* when the Class I railroads handled 2,427,000,000 tons of revenue freight, the non-revenue tonnage was 268,000,000, or about 10 per cent of the total. This percentage of deadhead freight has dropped but slightly in the past 10 years, indicating conclusively that not enough attention is being paid to this expense.

We hear on every hand the fallacious theory that it doesn't cost anything to move a certain carload of deadhead freight because we have the trains moving anyway, the idle equipment, the operating organization already on duty. Admitting that the railroads can handle a big increase in business with little or no increase in organization or facilities, nevertheless, we have no basis for assuming that any part of the total handled should not bear its share of the cost.

The average cost of moving a ton of revenue freight one mile, as developed by the Interstate Commerce Commission, is reported to be about 7 mills. There is not much reason to believe that a railroad can move its deadhead freight more cheaply than its revenue business. Indeed there is a tendency toward waste in such movement that serves to increase the cost. Unnecessary mileage, abuse of equipment, such as partial loading of cars and delays in loading and unloading, unnecessary switching, etc., are glaring examples. But even if we discount the average cost and figure the 45,000,000,000 ton-miles of deadhead movement in 1929 at 5 mills, we are astounded to read (*Railway Age*) that the cost to the railroads of hauling their own material and supplies was $225,000,000. How much of this was for back haul and unnecessary transportation no one knows, but it is obvious that here is an element of cost that demands attention. Indifference to the cost of transportation is as disastrous to a railroad as to any other business.

Waste is the parasite that eats up the profits and saps the life from a business. How much is the cost of company materials actually used increased by the cost of wasted materials? An examination of scrap piles shows costly items of material scrapped before their fitness for service is exhausted. Even new material has to be sorted out, carelessness in handling having allowed it to get into the scrap. New material, ruined by faulty machining or careless handling, or some mistake in ordering, is often revealed.

Premature Scrapping Expensive

The main source of waste is the scrapping of material before it is worn out and the failure to reclaim such material and put it back into service. Sometimes no repairs are necessary; sometimes a comparatively slight investment in repairs will continue its life indefinitely. A severe shortage of journal bearings on a certain railroad brought about investigation as to why there was such an abnormal demand. The result

revealed that hundreds of the bearings returned to the foundry to be relined were in serviceable condition. Overzealousness in making replacements was the cause. The inspectors were playing safe without regard to cost.

The freight-car wheel bill on another road was scrutinized and a wheel committee was formed to study wheel defects and instruct inspectors. By more intelligent interpretation and adherence to rules governing condemning limits, an erroneous reduction was made. For the year 1928, the cost of freight-car wheels on this road was $719,000, while for 1930 it had dropped to $165,000. A reduction in mileage was somewhat responsible, but the cost per 1,000 miles dropped from $2.02 in December, 1928, to $0.77 in December, 1930.

In 1920, a certain railroad purchased 10 pair of locomotive cylinders for replacements. Through the development of oxyacetylene welding, these purchases dropped to 2½ pair, in 1930, notwithstanding the larger number of locomotives in service under much heavier duty.

The High Cost of Handling

Waste is not confined to use of material; it is just as prevalent in the handling of it. Splendid progress has been made in recent years, in handling company materials. But, have we gone as far as possible in this direction? There is still divided responsibility in ordering and storing materials. There is still waste. At any number of shops, the workmen are still leaving their benches to go to the store-room, or to kill time while they pretend to go for material. Labor gangs with push trucks or wheelbarrows are still handling material that could be done more cheaply with proper equipment. There are still loafing, and mistakes, and unnecessary handling.

The basis of existence of a supply organization is to keep down the cost of company material—to save money. It rests with management as to whether it is getting all of the returns available from this line of investment.

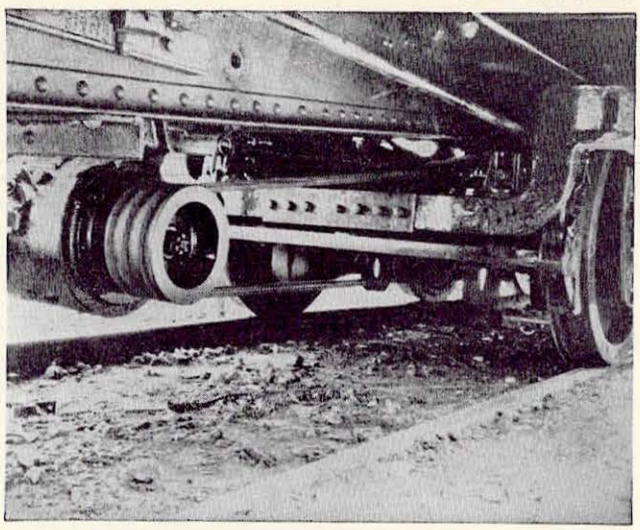
Texrope V-Belt Axle-Generator Drive

THE Texrope V-belt drive, a product of the Allis-Chalmers Manufacturing Company, Milwaukee, Wis., has been adapted to driving axle generators on railroad passenger cars, some of which have traveled well over 125,000 miles to date with entirely satisfactory results and no appreciable signs of belt wear. The drive consists of three endless V-type belts, transmitting power from a special triple V-groove pulley on the car axle to a similar pulley of smaller diameter keyed to the generator shaft. The pulley grooves are so proportioned and designed as to provide a firm, slightly wedging contact with the belts and eliminate slipping. The depth of the grooves, in conjunction with the angle to which the sides are machined, is said to prevent any possibility of the V-belts running out of the grooves under ordinary curve conditions and resultant truck angularity.

Reliability and Efficiency High

The principal advantage claimed for the Texrope V-belt drive, as applied to car axle generators, is a high degree of reliability under all weather conditions. As stated, the belts are positively held in the correct running position. There are no joints to fail or give trouble. Each belt is designed more than strong enough to carry the whole load if anything should happen to the other two belts, thus providing an unusually large factor of safety. In freezing weather, the wedging action of the belts pulling into the grooves has a tendency to eliminate the collection of dirt and the formation of ice, thus preventing difficulty from these causes.

Another important advantage claimed for this type of axle-generator drive is high efficiency. Power is transmitted by the wedging action of the belts as they pull into the V-shaped grooves of the sheaves. This construction assures smooth and positive starting, the belts absorbing vibration and the drive being said to operate with an efficiency of 98.9 per cent. The absence of belt slip keeps the generator at charging speed all of the time the car is at this speed and thus assures dependable power for lights and battery charging. In those cases in which the drive has been used the car batteries have received enough charge on the road to make charging at terminals unnecessary. In freezing weather the Texropes were found to be entirely free from ice or frost.



The Texrope Triple V-Belt Drive as Applied to a Body-Hung Car Lighting Generator

A feature of the drive, which would at first seem a serious objection, is the fact that the belts are endless and that the inside pair of truck wheels must be dropped in order to install the endless belts around the axle. It is also necessary to cut a small piece out of the truck frame and install a spacer block and a channel iron as a bracing member. Experience indicates that this operation requires only a little time, however, and, in view of the high reliability and long service life anticipated with this type of belt, the V-belts will not ordinarily have to be replaced except when the car is in the shop for other repairs.

This type of V-belt drive is widely used (over 100,000 installations) in general industry and, when used in paper mills and other plants where power drives are constantly subjected to excessive moisture, dust and dirt, has given excellent results. The absence of belt slip under these adverse conditions prevents "burning up" of the belts and promotes long and effective service life, characteristics which railroads would like to see incorporated to an increasing extent in their axle-generator driving equipment.

Receivers for F. E. C.

(Continued from page 358)

restricted and can fix rates from time to time as expediency justifies.

"Also, with the completion of hard surfaced roads by governmental agencies, paralleling our road, the private automobile and the bus have cut deeply into our passenger business, and in the last two years the truck has proven a serious competitor for freight business.

"It may not be amiss to recall that in the years of 1923, 1924 and 1925 our net earnings, after paying fixed charges, were approximately two and one-half times the fixed charges, whereas due to the above reasons, during 1927, 1928, 1929 and 1930 the operation produced an actual deficit for each of those four years totaling for that period $6,720,000, approximately."

The railroad, as is generally known, is, from a physical standpoint, a splendid property. Its double tracked, automatically signaled, almost curveless main line from Jacksonville to Miami, on practically a water level route, would with reasonable traffic density be one of the most economically operated railway lines in existence. Instead, however, because of meager traffic, this line has been a handicap to profitable performance by reason of the great investment it represents. The company had a deficit after fixed charges of $1,998,312 in 1930; $1,325,259 in 1929; $1,697,425 in 1928; and $1,774,762 in 1927. In 1926 it had net income, after fixed charges, of $2,783,949 and in 1925 its net income was $3,840,370. The peak of gross revenues was reached in 1926 when they totaled $29,427,460. In 1930 they had declined to $11,729,811 or 60.2 per cent. With such a disastrous loss of business the fact that only now has receivership finally come stands as a tribute to the ability and energy of the company's management.

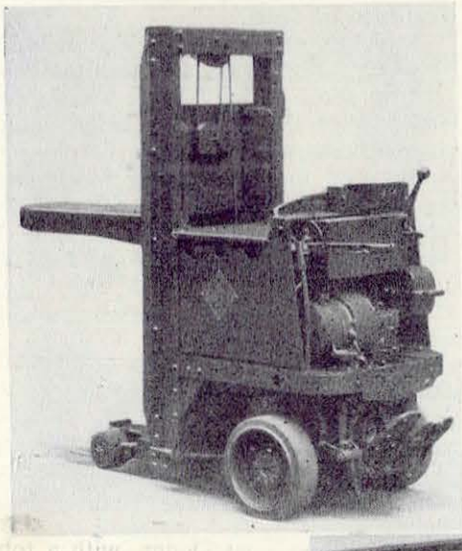
The collapse of the Florida boom and subsequent economic prostration in its territory were blows which might have been withstood successfully, but not when combined with the great growth of tax-aided competitors. Common carrier buses, according to the last available figures, were paying but 7.23 per cent of their gross revenues in taxes, and such payment included their contribution toward the expense of maintaining the highway for them. In 1930 the Florida East Coast paid 11 per cent of its gross revenues in taxes alone and an additional 14.8 for maintenance of way—a total of 25.8 per cent of its gross revenues, which may be compared with the 7.23 per cent of gross revenues exacted from bus lines for similar purposes. Bearing such an unequal burden, the railroad naturally is at a growing disadvantage in meeting any economic crisis.

Lift Trucks for Tight Places

THE Elwell-Parker Electric Company has developed two new models of lift trucks, one called a double-utility electric truck, and the other, adapted especially for use in store-rooms in connection with hand lift truck arrangements where space is cramped and other conditions make it inconvenient to use the conventional size truck. Features of the double-utility truck are the use of a fork arrangement, instead of a platform for carrying skids; also a swinging boom for lifting loads independently of skid operations and the ability to tilt the hoisting frame forward or backward to afford additional flexibility in picking up and elevating loads. The fork is low enough so that it can pass under skids and other containers which are built chiefly for handling by hand lift trucks, and large wheels are used for speedy operation over uneven floors.

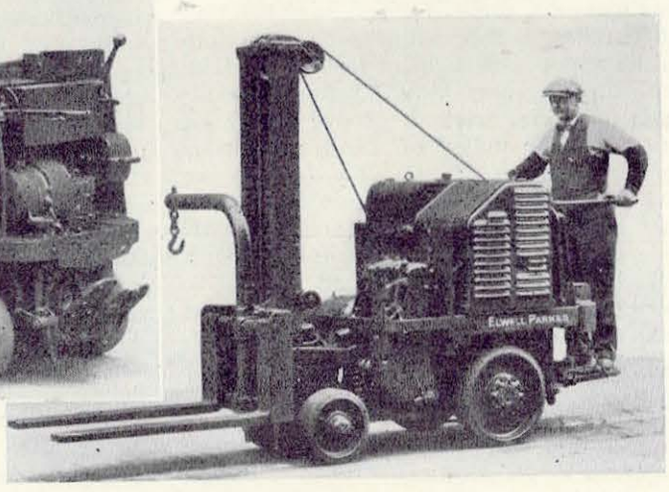
The boom can be swung to either side of the truck and is fixed to the frame so that it can be lifted or lowered. It is built in the truck for the dual purpose of lifting loads onto skid platforms and also for carrying loads from place to place independently of skid operations. The boom will carry 2,000 lb. When used to carry loads, the platform-lifting forks are swung upward and backward over the hoisting mechanism of the truck to allow the free movement of the boom. The tilting arrangement allows the frame to be tipped forward 8 deg., or backward 35 deg., which gives the truck considerably more flexibility in picking up loads, carrying them and unloading at higher elevations.

The other model is a miniature truck built with a width of only 29 in. It is equipped with a platform 18 in. wide and 41 in. long for handling platforms ranging from 24 in. to 30 in. wide and 48 in. long, which can be loaded up to 3,000 lb. and elevated 63 in. This truck is designed especially for severely cramped operations and can be fitted to operate with either gasoline or battery power.



A Baby Model

Power Truck with Boom for Small Skids



Union Pacific Bus Lines Extend to All Parts of Its Railway System

Substituting Motor Coaches for Trains

Railway officers tell results of present bus operations and reasons for slow extension of service—Patrons satisfied

SOME railways, like the Boston & Maine, the New York, New Haven & Hartford, the Union Pacific, and the St. Louis Southwestern, have paralleled almost their entire railway systems with motor coach lines, largely for the purpose of substituting bus service for unprofitable local passenger train service. Other roads have engaged in motor coach operation on a smaller scale, operating only from one to a half-dozen routes, the mileage of which is but a small fraction of their railway mileage.

In order to develop the reasons why those railways, which have been successful in experimental operation of motor buses, have not expanded their highway services, the *Railway Age* addressed to a number of officers in charge of traffic and motor coach operating departments, the following questions:

(1) What percentage of your railway mileage is now paralleled by highway routes over which you are operating motor buses in substitution for trains?
(2) What difficulties, if any, were encountered in effecting these substitutions, and how were the difficulties overcome?
(a) What conditions, if any, are preventing your carrying out additional substitutions of motor buses for unprofitable passenger trains?
(4) What is the attitude of your patrons on the lines affected towards the substitution of bus service for train service?
(5) What comments have you as to the success of your present substitutions, and as to the advisability of further replacement of train service with bus service on the lines of your railroad?

Fear Abandonment of Service

In reply, one railway officer, who asked that his name be withheld, says, "Practically all our rail lines are paralleled by highways, although there are stations on nearly every line which, as a practical matter, cannot be served by motor coach. This is generally due to the condition of the highway, the slowing up of schedules, etc. Most of the difficulties encountered in making substitutions comes from the public desire to have maintained the train service which they have had so long. Possibly there is a feeling that a bus substitution is the first step toward complete abandonment of service. This attitude is reflected even more strongly in the decisions of regulatory commissions.

"In most cases where buses have been substituted for train service, the patrons of the lines have been well satisfied. We consider that the replacements we have already made have been profitable to the railroad, and we are constantly working toward further substitutions of motor coaches for small revenue trains."

George B. Haynes, passenger traffic manager of the Chicago, Milwaukee, St. Paul & Pacific, advises that less than two per cent of the rail lines of the Milwaukee are paralleled by its motor coach routes. This company has encountered no difficulties in effecting motor coach substitutions. It has not carried out additional substitutions because of the fact that the desirability of further extension of the bus service has not been definitely indicated. So far as the public is concerned, there has been no opposition of consequence to the substitution of buses for trains.

J. V. Lanigan, passenger traffic manager of the Illinois Central, says, "We are operating only two motor buses, between Dubuque, Iowa, and Waterloo, and between Waterloo and Fort Dodge, with a total bus mileage of about 12,000 per month, or a trifle less than one per cent of our total steam train mileage, excluding suburban

operations. Both of these buses were placed in service in substitution for local steam trains, and we experienced no difficulty in connection therewith. This service is operated by a subsidiary known as the Central Transportation Company.

Further Opportunities for Substitution

"We recently applied to the Illinois Commerce Commission for permission to operate a bus between Kankakee, Ill., and a connection with our suburban service at 211th street, in the Chicago area, which will enable us to discontinue a local steam train. There is no doubt that we could do so at a number of other points, except that the future is still so uncertain that we rather hesitate to go ahead while the possibility that bus operation in itself will prove unprofitable, is facing us. When conditions adjust themselves so as to give us a little clearer view of the situation, I have no doubt that we can substitute motor buses for certain local steam trains to advantage. Our policy thus far has been not to undertake bus operation except in substitution for steam trains.

"With respect to the buses already in service, our patrons have voiced no complaint and I believe they are satisfied with the arrangement we have made in Iowa. Our bus service in Iowa has proved satisfactory. The bus between Dubuque and Waterloo has been in service about two years and has fairly sustained itself. The bus between Waterloo and Fort Dodge was only put on January 1, but the indications are that it also, will carry itself. This, of course, is aside from the very great saving in operating expenses which has been effected in substituting this bus service for steam trains."

No Difficulties Encountered

R. H. Crozier, general passenger agent of the Spokane, Portland & Seattle, says, "About 18 per cent of our rail mileage is, in a general way, paralleled by our motor bus operations, but only on a short four-mile branch has a complete substitution for passenger trains been made. On some of the other mileage, trains have been withdrawn on account of decreased patronage, and a substantial volume of traffic is handled on the buses. No material difficulties were encountered in the introduction of the motor transport program. Motor bus operation has not been extended to other sections on account of doubt of its success. No adverse attitude on the part of the public has developed where substitution has been made. Substitutions or partial substitutions have allowed economies to be made. At present no extension of the bus service seems advisable."

John W. Blount, general passenger agent of the Central of Georgia, says, "Less than seven per cent of our railway mileage is now paralleled by highway routes over which we are operating motor buses in substitution for trains. During the winter months, when the Tybee Line is in operation, the percentage is slightly greater. On lines where motor service has been inaugurated to take the place of passenger train service, we had no serious difficulty in making the change. In a few cases where we might have been able to substitute motor service for train service, it was not found practicable because of road conditions, the highway not always following the line of railroad. On the lines where motor service is established, passenger traffic is very light, and the available business is taken care of in a satisfactory manner. We contemplate replacing train service with motor service between Atlanta, Ga., and Jonesboro, a distance of 20 miles, and between Savannah and Guyton, a distance of 30 miles. However, we do not expect the motor service to be self sustaining."

Another railway officer, who does not desire to be quoted, says, "We are operating eight routes which replace train service. There are five or six other points where train service has been discontinued, and local bus operators are providing the service under contract with the railroad. I find that bus lines which replace train service are not profitable. This railroad has followed the policy of making every effort to get rid of the unprofitable train service without putting on bus operation. In many cases there are local buses in the field and through co-operation between the railway and the owners of such bus lines, the public is well taken care of.

"We do not find the public particularly antagonistic toward bus operation. They are opposed to losing train service in most cases, but it is remarkable what reductions have been made in passenger train service on this railroad in the last two years, and in most cases without any opposition on the part of the public. We are heartily in favor of taking off unprofitable trains and putting on more bus operation, but always letting the local man in the field handle the highway end of it.

"We are working on a program to bring bus and rail operation closer together and to allow independent bus lines to use railroad stations where this can be arranged. The railroad will receive its commission on the sale of tickets, and in some cases I think the railroad will be paid for letting bus patrons use the waiting rooms. There are many places where the two types of transportation can be brought closer together."

Southwestern Lines File Store-Door Tariff

(Continued from page 353)

tween these stations and stations in Zones 1 and 2, from and to which the interstate all-rail rate on first class does not exceed $1.33 per 100 lb.; shipments between stations included within Zone 4 and between these stations and stations in Zones 2 and 3, from and to which the interstate all-rail rate on first class does not exceed $1.33 per 100 lb. by more than certain arbitraries (ranging from 7 cents for a distance of 5 miles and under 28 cents for distances of over 300 miles) for the distance in Oklahoma and Texas Differential Territory and New Mexico, used to determine the first-class rate as provided in the applicable tariffs; shipments between stations included within Zone 5 and between these stations and stations in Zones 2, 3, and 4, from and to which the interstate all-rail rates on first class does not exceed $1.60 per 100 lb. Certain exceptions provide for the payment of an additional charge for the pick-up and delivery service, but not to exceed 10 cents per 100 lb., where the rates applying to shipments are lower than specified minima under the Western Classification and its exceptions.

The pick-up and delivery service does not apply on articles in excess of 22 ft. in length, nor those in excess of those 14 ft. in length which are more than 6 ft. in width or 6 ft. in height, and it does not apply to plate glass in packages exceeding 4 ft. in width or 9 ft. in length. If a shipment is once tendered for delivery and the delivery cannot be accomplished through no fault of the carrier, no further effort will be made to complete the delivery except on request, and at an additional

charge of 10 cents for each 100 lb. or fraction thereof for each tender. On freight not entitled to free pick-up and delivery service, this service will be provided at an additional charge of 10 cents per 100 pounds for the pick-up service, or 10 cents per 100 pounds for the delivery service. No charge will be made for the delivery service on shipments which have been accorded pick-up service either free or at extra charge. Shipments moving to agency stations which are entitled to both pick-up and delivery service will be permitted to be consigned c.o.d. The tariff provides a scale of additional charges for the c.o.d. service.

The tariff was issued August 19 and is to become effective October 1.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended August 22 amounted to 748,711 cars. This was an increase of 5,975 cars as compared with the week before but represents an ever-increasing drop as compared with the corresponding week of the preceding two years. As compared with last year it was a decrease of 191,847 cars, and as compared with 1929 it was a decrease of 389,255, or 34 per cent. Loading of livestock, however, showed an increase of 1,200 cars as compared with last year, but grain and grain products showed a decrease of 13,215 cars. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

Week Ended Saturday, August 22, 1931

Districts	1931	1930	1929
Allegheny	168,402	210,142	254,790
Pocahontas	143,182	189,409	231,199
Southern	47,358	54,335	63,265
Northwestern	103,152	122,632	148,719
Central Western	109,042	150,666	187,852
Southwestern	116,875	138,279	162,969
Total Western Districts	60,700	75,095	89,172
Total All Roads	286,617	364,040	439,993
Commodities			
Grain and Grain Products	44,760	57,975	61,831
Live Stock	23,042	21,842	26,202
Coal	118,889	152,908	174,784
Coke	4,363	7,858	12,002
Forest Products	27,333	41,376	69,663
Ore	35,724	55,087	75,736
Merchandise L.C.L.	214,010	236,423	261,800
Miscellaneous	280,590	367,089	455,948
August 22	748,711	940,558	1,137,966
August 15	742,736	922,823	1,102,567
August 8	734,780	904,157	1,092,153
August 1	757,293	919,781	1,105,920
July 25	741,752	919,301	1,102,553
Cumulative totals, 34 weeks	24,894,271	30,443,505	34,215,637

The freight car surplus for the week ended August 15 averaged 574,384 cars, an increase of 6,013 cars as compared with the week before. The total included 297,722 box cars, 210,806 coal cars, 26,486 stock cars and 14,808 refrigerator cars.

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended August 22 totaled 47,461 cars, a decrease of 95 cars from the previous week and a decrease of 16,448 cars from the same week last year.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada		
August 22, 1931	47,461	21,546
August 15, 1931	47,556	21,544
August 8, 1931	44,897	22,144
August 23, 1930	63,909	30,191
Cumulative Totals for Canada		
August 22, 1931	1,629,741	897,051
August 23, 1930	2,012,579	1,151,102
August 24, 1929	2,259,795	1,410,663

Western Rate Hearings Conclude Testimony

(Continued from page 364)

opposing the 15 per cent increase was divided into two major divisions. The principal testifying industries—grain, livestock, coal, cement and oil—endeavored to show that they are in such a depressed condition that injury might result from an increase in freight rates by adding to their cost of distribution. The second division of the testimony was designed to show that the competition from trucks and other public carriers has so changed that a 15 per cent increase would throw to other channels much business now going to railroads.

M. R. Taylor, transportation inspector of the Kansas Public Service Commission, testified that there are 83,000 trucks in Kansas. As a gage of motor transportation in competition with railroads, he pointed out that truck service parallels railroad lines for 21,285 miles in the state, while buses compete over a network of 7,900 miles. The average haul of trucks in the Kansas City territory was given as 118 miles.

Hearing at Dallas

The use of trucks in hauling products to market was described by objectors who testified at the Dallas hearing, which was held on August 21-25. E. R. Tanner, manager of the El Paso Freight Bureau, testified that agriculture could not bear an additional burden and told of the increasing use of trucks in Texas in preference to the railroads, predicting that a rate increase would make this trend more apparent. J. K. Moore, general traffic manager of the American Cotton Co-Operative Association, also said that the use of trucks will increase whether railroad rates are raised or not. He said that a farmer who can load 10 or 12 bales on a truck might make the haul himself with profit. Robert Mayer, vice-president of the Dallas Cotton Exchange, said that America is losing her world market in cotton to producers in India, Argentine, Brazil, Peru and Africa, and that the largest single item in calculating the price from the producer to the consumer is that of interior freight. The cotton business, he continued, is a highly competitive one and frequently a difference of 5 or 10 cents per 100 lb. will prevent the consummation of a sale.

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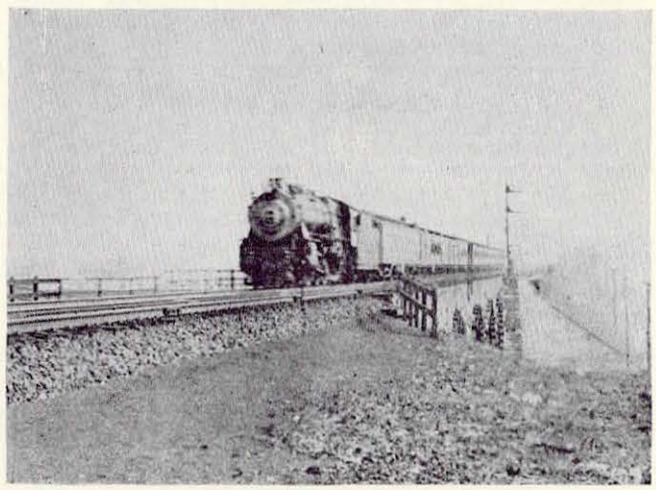

Photo by Chas. A. Gorgas

A Westbound Passenger Train Crossing Conestoga Creek, near Lancaster, Pa., on the Main Line of the Pennsylvania

Odds and Ends . . .

Thoughtful Engineman

For a thoughtful act, M. Thell, engineman of a local freight train of the Missouri Pacific operating through Merritt, Kan., has won the regard of the residents of that town. Recently upon approaching a highway crossing near Merritt, Thell stopped his train to allow a funeral cortege to pass.

After You, My Dear Alphonse

J. L. Walsh, secretary of the Steam Railroad Section of the National Safety Council, tells the story of an automobile and a track motor car which approached a grade crossing at the same time. Both drivers were cautious and brought their cars to a full stop. Each, being polite, waved to the other to go ahead. Unfortunately, both invitations were accepted and a collision resulted.

A Headache for the Payroll Department

There should be no more arguments about which railroad has the employee with the longest name. As far as we are concerned the Missouri Pacific wins in a walk, for it has a colored trucker in its Little Rock freight house whose name is Hansollensbockenoffenhassengraphensteiner Holloway. To save you the trouble of counting, we will say there are 41 letters in his first name.

"Service" Out of Service

History is being made on the Norfolk & Western. In a contest for a prize of $100, to be given to the employee who suggests the best slogan to advertise the freight transportation facilities of the railway, it is specified that entrants must not make use of the word "service." If some employee of the Norfolk & Western can suggest a synonym for "service", one which can be brought into general use, he will be performing a real "service" for the railways and their writers of advertisements.

We Don't Know Whether This Makes Us Feel Better or Worse

No sooner had we deplored the discharge of a couple of call boys on a railroad in the Northwest and wondered pessimistically where the railroad presidents of the future were to come from, than news arrived of the appointment of a new call boy on the Lehigh Valley at Hazleton, Pa. In some respects, however, this news is more disquieting than the other, for the "call boy", in this case, is Miss Martha Butler, formerly chief clerk in the car department.

A Grandstand on Wheels

New London, Conn., on the River Thames and Long Island Sound at the south end of the steel of the Central Vermont is annually the Mecca for thousands of the alumni of Harvard and Yale Universities, two of the oldest institutions of learning in North America. The eyes of the Crimson and Blue alumni are focused on New London once each year, for it is on the River Thames that the crack oarsmen stage the annual regatta; an event that has been termed an "exclusive rowboat race."

The annual gathering of "American royalty" at New London calls for many hundreds of hours of preparation on the part of Central Vermont officials in connection with the operation of the "rolling grandstand", which consists of 32 specially equipped cars which keep abreast of the Crimson and Blue oarsmen along the four-mile Thames course.

Every year Mechanical Superintendent H. T. Nowell is called upon to equip 32 serviceable flat cars for "rolling grandstand" service. These cars are shopped at St. Albans, given a thorough overhauling and freshly painted. Four rows of seats constructed in accepted grandstand style, and accommodating 87 persons, are placed in each of the 32 cars. A frame of steel, over the rear and top of which is stretched white canvas, is also placed on each car; the cars are numbered 1 to 32, starting from the forward engine, and equipment is assembled at New London at least a week before the big race.

Two locomotives are used to haul the train along the banks of the Thames while the race is on; one being placed at the head of the "moving grandstand" and the other being used as a pusher. On the return trip to New London station, the functions of the locomotives are naturally reversed.

The posts of ticket takers, one to each car, are assignments much sought after by the employees of the Central Vermont. It is needless to say that applicants for such assignments far exceed the number actually required as the job carries with it the privilege of a reserved seat at this most exclusive and exciting of American sporting events.

Guards are also assigned to the cars and their duties do not call particularly for preserving order, which is something that doesn't have to be done at a Yale-Harvard race, but for assisting passengers on and off cars and seeing to it that passengers do not transfer from one car to another while the train is in motion.

Every precaution is taken to guard against any incident that might lead to faulty operation of the train. Once the race is underway and the train assumes the role of a grandstand, any incident that would tend to interrupt the schedule and prevent the train from keeping abreast of the oarsmen would be disastrous, so no efforts are spared in the advance preparations to insure success.—From Canadian National Railways Magazine.

* * *

Courtesy Spokane, Portland & Seattle

For Saving a Life

Plaque awarded by the Spokane, Portland & Seattle to Glen C. Pendergast, traveling freight and passenger agent, for saving a two-year old Japanese girl from drowning on July 4, as reported in the *Railway Age* of August 22, page 303.

NEWS

Adequate Railway Rates Urged by Otto H. Kahn

Banker also suggests that railway managements curb costly competitive practices

The fruitful and effective operation of railroad regulation would be promoted "if railroad service were accorded more adequate compensation and if the railroads were relieved from certain unduly hampering restraints," according to Otto H. Kahn of Kuhn, Loeb & Co., who, on August 29, issued a statement embodying proposals for actions which he thought would bring an early end to the current business depression. A further suggestion with reference to railroads was that "railway managements might advantageously consider ways and means for restraining the ardor of competitive practices."

In addition to the measures designed to help the railroads, Mr. Kahn proposed, as accompanying aids to business recovery, a modification of the anti-trust laws, a liberalization of the Volstead Act pending a vote on repeal of the Eighteenth Amendment, economy in government, a removal of maladjustments which the peace treaties and tariffs have created and the fostering of a world-wide spirit of co-operation.

That section of Mr. Kahn's statement relating to the railroads follows:

"The railroads are not only in themselves one of the most vital industries of the country, but the prosperity of a number of other industries is, to a considerable extent, dependent on them. Moreover, thousands of millions of dollars of railroad securities are held for investment throughout the length and breadth of the land, a large proportion thereof by savings banks, insurance companies, and other institutions, representing the investments of millions of men and women of small means.

"Furthermore, it should be borne in mind that many additional millions of capital are naturally and constantly needed for betterments, extensions, improvements and kindred purposes, which funds can only continue to be obtained from the public if there is reasonable assurance that, under proper management, they will yield safety and a fair return.

"It is the conception of the law governing our railroads that they are administered by private management, and under private financial responsibility, subject to supervision and regulation by the Interstate Commerce Commission.

"The principle is wise and just, but I venture to suggest that the fruitfulness,

(Continued on page 379)

"Most governing bodies and leaders of opinion regard the railway as still essential to business, despite the inroads of road traffic, yet little or nothing is being done to protect them. It is established that the highway vehicles have an unfair advantage through their use, without adequate remumeration, of roads built at public expense, compared with the necessity of railways to build and maintain a private right of way.

"A writer in the London Times thus describes the one-sided condition in Britain: 'Nearly all our expenditure on roads is due to the heavy lorries and passenger vehicles. It is only because they are allowed to throw most of their running costs on the ratepayer that they can compete in charges and fares with the railways.'

"It would be idle to ignore certain advantages from the speed, mobility and low rates inaugurated by truck operators; but will the public accept these advantages indefinitely and permit railways to be jeopardized as an essential instrument in national business? Secret rates are made by truck companies to the disadvantage of one shipper as compared with another, it is charged. This is an old abuse, against which Governments have long had to make war."

—Toronto Globe

New Equipment Installed

The railroads of the United States in the first seven months of 1931 placed 8,264 new freight cars in service, according to the Car Service Division of the American Railway Association. In the same period last year, the total was 55,660, and two years ago it was 42,552. Of the cars installed, 3,021 were box cars compared with 28,616 in the first seven months of 1930; there were 3,837 new coal cars, compared with 21,463. This year's record includes 382 flat cars and 1,016 refrigerators. The railroads on August 1 had 7,984 new freight cars on order compared with 19,627 cars on the same day last year and 36,335 on the same day two years ago. They placed in service in the first seven months this year 94 new locomotives compared with 484 in the same period in 1930 and 371 in the same period in 1929. New locomotives on order on August 1 this year totaled 32 compared with 296 on the same day last year and 410 two years ago.

Railway Net for July Totals $56,534,903

Seven months' return 2.19 per cent; expenses down 17 per cent, revenues, 18.6

Class I railroads, for the first seven months of 1931, had a net railway operating income of $295,085,044, which was at the annual rate of return of 2.19 per cent on their property investment, according to reports compiled by the Bureau of Railway Economics. In the first seven months of 1930 their net was $460,448,586, or 3.48 per cent. Operating revenues for the seven months totaled $2,564,583,852, compared with $3,149,353,490 for the same period in 1930, or a decrease of 18.6 per cent. Operating expenses amounted to $1,996,901,513, compared with $2,405,567,388 for the same period one year ago, or a decrease of 17 per cent.

The railroads in the seven months paid $193,544,950 in taxes, compared with $211,632,286 for the same period in 1930, a decrease of 8.5 per cent. For July, the tax bill amounted to $28,806,324, a decrease of $2,527,373 under July the previous year.

Thirty-five Class I railroads operated at a loss in the first seven months, of which 11 were in the Eastern district, six in the Southern, and 18 in the Western district.

For July alone the roads had a net of $56,534,903, which, for that month, was at the annual rate of 2.37 per cent. In July, 1930, their net was $83,069,375 or 3.55 per cent. Operating revenues for the month amounted to $377,146,417, compared with $457,097,548 in July, 1930, a decrease of 17.5 per cent. Operating expenses in July totaled $280,127,321, a decrease of 15.5 per cent.

Class I railroads in the Eastern district for seven months had a net of $160,625,782, at the rate of 2.40 per cent. For the same period in 1930, their net was $259,936,938 or 3.99 per cent. Operating revenues for the seven months totaled $1,284,765,338, a decrease of 19.2 per cent, while operating expenses totaled $994,774,095, a decrease of 16.7 per cent. For July the net railway operating income was $24,254,064, compared with $39,383,889 in July, 1930.

Class I railroads in the Southern district for the seven months had a net of $28,329,245, which was at the rate of 1.52 per cent. For the same period in 1930, their net amounted to $48,643,822, at the rate of 2.61 per cent. Operating revenues for the seven months amounted to $324,047,811, a decrease of 17.4 per cent under the same period in 1930, while operating

expenses totaled $263,430,953, a decrease of 15.4 per cent. For July they had a net of $2,831,333 compared with $5,454,366 in July, 1930.

Class I railroads in the Western district for the seven months had a net of $106,130,017, at the rate of 2.15 per cent. For the same seven months in 1930, they had a net of $151,867,826, at the rate of 3.12 per cent. Operating revenues for the seven months' period amounted to $955,770,703, a decrease of 18.1 per cent, while operating expenses totaled $738,696,465, a decrease of 17.9 per cent. For July alone, the net amounted to $29,449,506, as compared with $38,231,120 in July, 1930.

CLASS I RAILROADS—UNITED STATES

	Month of July 1931	1930
Total operating revenues	$377,146,417	$457,097,548
Total operating expenses	280,127,321	331,618,988
Taxes	28,806,324	31,333,697
Net railway operating income	56,534,903	83,069,375
Operating ratio—per cent	74.28	72.55
Rate of return on property investm't	2.37%	3.55%
	Seven months ended July 31	
Total operating revenues	$2,564,583,852	$3,149,353,490
Total operating expenses	1,996,901,513	2,405,567,388
Taxes	193,544,950	211,632,286
Net railway operating income	295,085,044	460,448,586
Operating ratio—per cent	77.86	76.38
Rate of return on property investm't	2.19%	3.48%

Southeast Shippers' Advisory Board

The Southeast Shippers' Advisory Board will hold its thirty-fifth regular meeting at Hotel Tutwiler, Birmingham, Ala., on Friday, September 11.

New Chief Engineer for Missouri State Commission

J. E. Flanders, assistant chief engineer of the Missouri Public Service Commission, has been promoted to chief engineer, to succeed F. M. Blake, who has resigned, effective October 1. Mr. Flanders is a graduate of the Missouri School of Mines, at Rolla, Mo., and has served with the commission for 10 years.

Railway Unemployed in Mexico Turn To Farming

The Federal government of Mexico, aided by the state government of Durango, has furnished land and farm implements to a group of railway employees at Durango, who have been laid off through force reductions. The group, which is comprised of 80 families, will form an agricultural colony.

Ausable Branch Passenger Trains Off

The New York State Public Service Commission has finally given permission to the Delaware & Hudson to discontinue operation of its two passenger trains, one each way daily, except Sunday, on the branch from Plattsburg westward to Ausable Forks, N. Y., 23½ miles. Following complaint and extensive hearings held last year, the commission ordered these trains restored, in November, to test the validity of the complainant's case; but no increase in the number of passengers has followed, and the present order is issued. It is held that adequate public means of transportation by a bus line is now provided. The mail is now carried by the buses; and the express and milk traffic can be carried on freight trains. During the present year, trains have made numerous trips without a single passenger.

Wage Statistics for June

Class I railways have reported to the Interstate Commerce Commission a total of 1,317,399 employees as of the middle of June, 1931, and a total compensation of $182,825,313. Compared with the returns for the corresponding month of last year this summary shows a decrease in the number of employees of 246,878, or 15.78 per cent. The total compensation show a decrease of $35,218,943, or 16.15 per cent.

Reduction in Rayon Rate Suspended

The Interstate Commerce Commission has suspended for seven months from September 1 tariffs filed by the railroads proposing to establish reduced rates on rayon and rayon yarn from Nashville and Bemberg, Tenn., to New Orleans and Mobile when for export. The rate from Nashville of $1.66 to New Orleans and $1.54 to Mobile was to be reduced to $1.15 to both points, and the rate from Bemberg, now $1.93 to New Orleans and $1.84 to Mobile, was to be reduced to $1.34.

Pullman Company to Charge for Second Passenger

The Pullman Company has filed with the Interstate Commerce Commission a tariff establishing a charge for a second passenger occupying a berth or section. The rate, which becomes effective on October 15, will be 20 per cent of the lower berth rate, but will not apply to children under 12 years of age, for whom full railroad transportation is not required. It is estimated that less than 10 per cent of the Pullman passengers will be affected by this new regulation.

Roadmasters Postpone Convention

The Roadmasters and Maintenance of Way Association, through its executive committee, has postponed for one year its 49th annual convention, which was to have been held in Chicago on September 22-24. This action, which was taken in recognition of the conditions prevailing in the railway industry, led to the first break in the continuity of the annual meetings of this organization in the 49 years of its existence. The next meeting is now scheduled to be held at the Hotel Stevens, Chicago, on September 20-22, 1932.

Rate Case to Be Argued September 21

Oral arguments in the general rate advance case, on the application of the railroads for authority for a 15 per cent advance, will be heard by the Interstate Commerce Commission at Washington, beginning on September 21, and briefs are to be filed with the commission by September 18, the commission has announced. The oral argument will be held before the entire commission, whereas the hearings have been held before a division of five commissioners, Meyer, Lee, Lewis, Eastman and Porter, at nine cities. In general hearings have been held before two commissioners.

Traffic and Purchases Hearings Concluded

At the close of the hearing held by the Interstate Commerce Commission on September 1, in connection with its investigation of railway traffic and purchases, at which testimony was taken from officers of the Reading, as reported in full on page 356 of this issue of *Railway Age*, Director Bartel announced that this would be the final hearing of the investigation, which has been in progress for about two years, unless notice is received within 20 days of a desire for further opportunity to testify.

Increased Use of Phone for Train Orders

Reports received from the railroads by the Telegraph & Telephone Section of the American Railway Association show that on January 1, 1931, telephones were used for the transmission of train orders over 154,075 miles of road compared with 99,047 miles on which the use of the telegraph is continued.

The extent of the increase in the use of the telephone for the transmission of train orders is shown by the fact that on January 1, 1920, the miles of road on which the telephone was used totaled 119,554. On the same date, the telegraph was being used on 134,667 miles of road.

Mexican Lines Install I. C. C. Accounting System

Following the adoption of the Interstate Commerce Commission accounting classification by the National Railways of Mexico, which was placed in effect on July 15, this road has appointed division accountants, who assumed their duties on September 1. It is estimated that the new system will effect a saving in salaries alone of $100,000 a year, in addition to the saving in materials that will accrue through a closer check on withdrawals from the stores. It will also be possible to close the accounts within 15 or 20 days after the end of the month, as compared with about three months under the old system.

Oregon Short Line Sues for Lower Assessment

The Oregon Short Line brought suit in the United States District Court at Boise, Idaho, on August 25, for an injunction to restrain the Board of Equalization from assessing the railroad at the same value for taxes this year as last year while several other classes of property received reductions. A temporary restraining order was issued by the court and the board was given 20 days in which to reply. The suit fixed the amount of alleged tax at $500,000 annually. The railroad complained that the action of the board would throw an undue burden on the railroad by requiring it to bear a larger portion of local govern-

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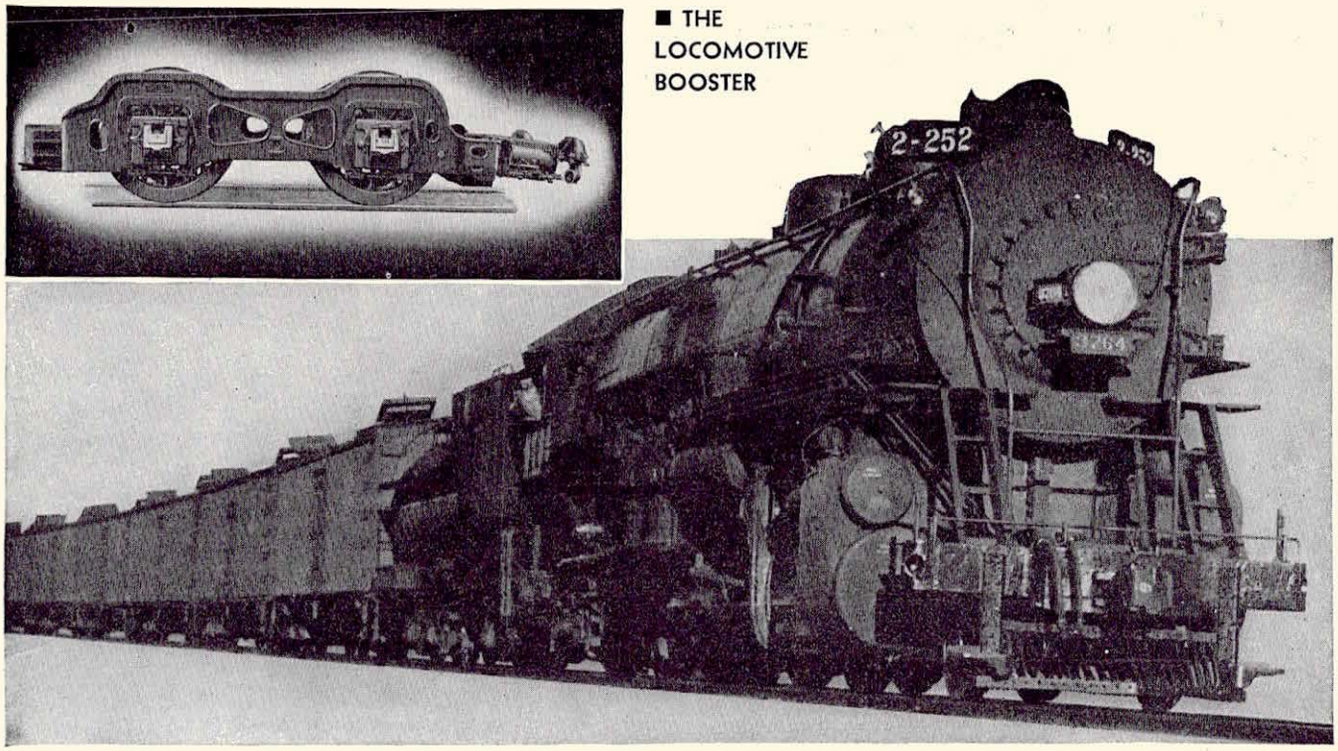


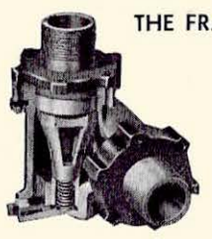
Moving Perishables with BOOSTER LOCOMOTIVES

WHEN the movement of perishables is at its height, The Locomotive Booster is particularly useful.

By starting heavy trains smoothly and quickly and by speeding movement over the road The Locomotive Booster

1. Reduces possible claims due to delays "en route" and spoilage.
2. Reduces frequency of re-icing "freezers".
3. Brings quicker release of special cars in short seasons.
4. Wins good will of shipper and consignee because of the greater consumption of fruit and other perishables which are received during the market demand.
5. Creates wider markets for perishables thru reduction of time in transit.

Booster equipped locomotives are speeding perishable freight movement on the leading railroads of the country.



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saves gaskets and
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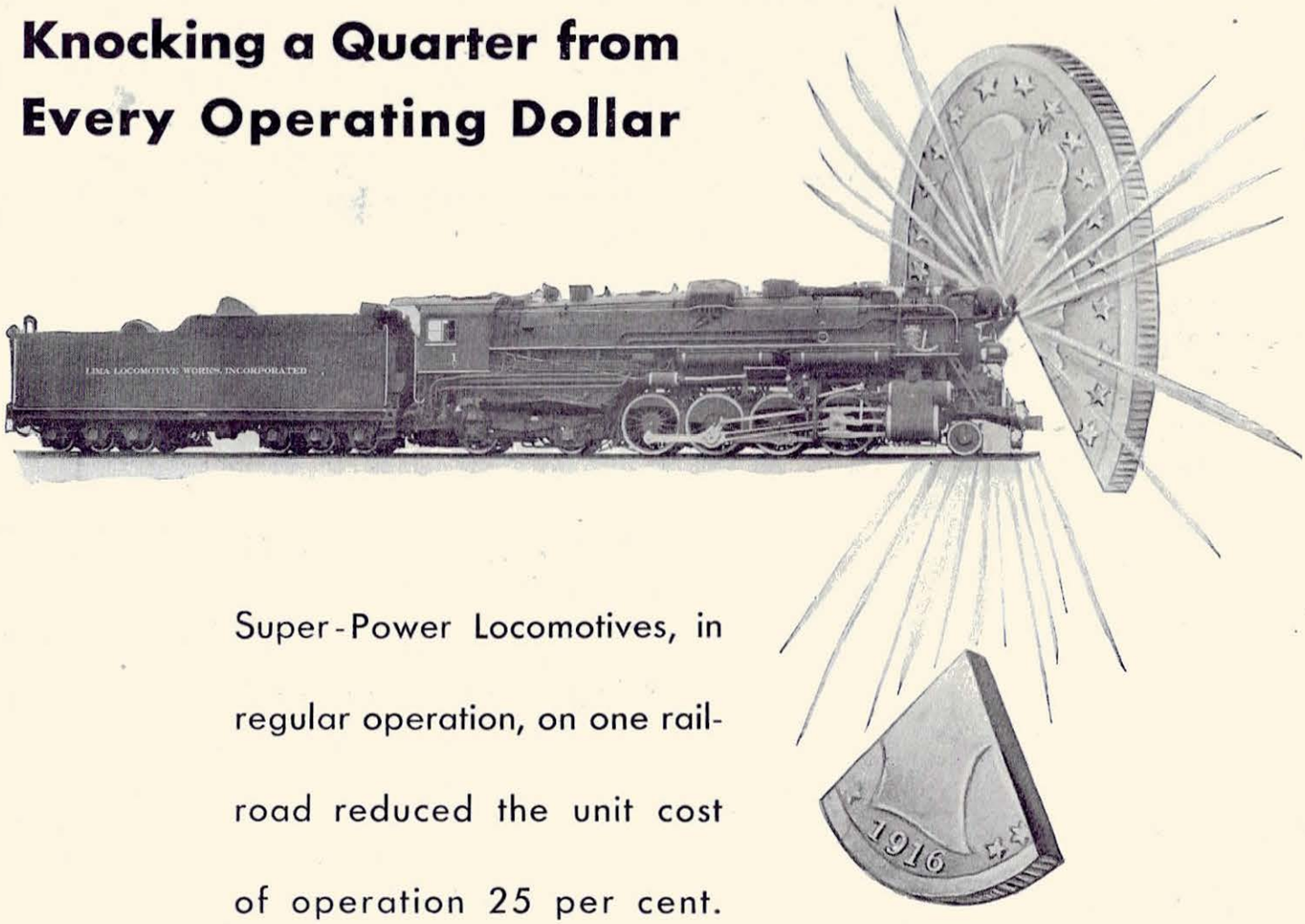

Super-Power Locomotives, in regular operation, on one railroad reduced the unit cost of operation 25 per cent.

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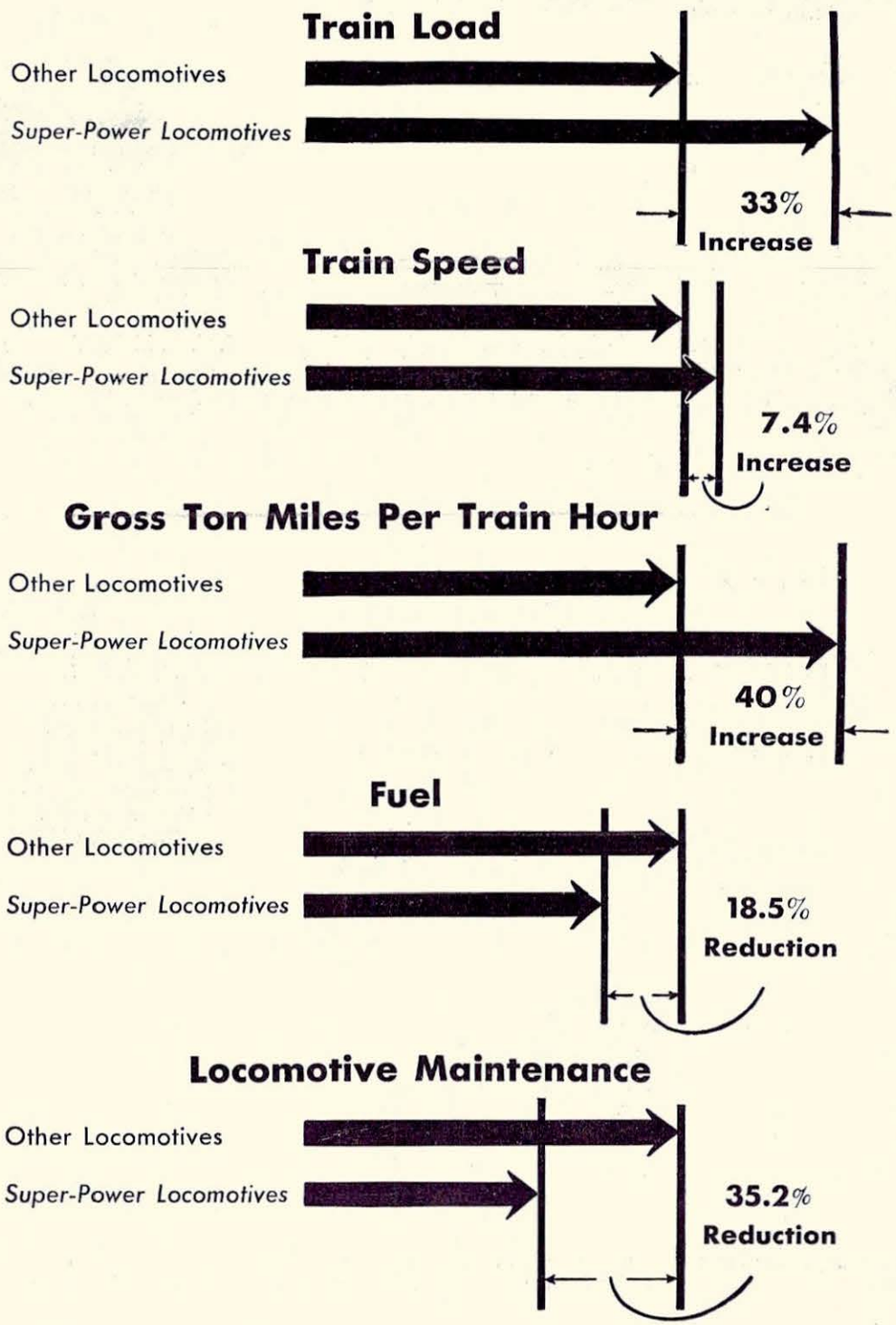

ment expense than was borne by other property.

Agricultural property, timber land and certain other classes received a reduction, the suit contended, alleging as well that such property was already valued for taxation considerably less than railroad property in violation of the constitution.

Bridge and Building Association Postpones Convention

The American Railway Bridge and Building Association has postponed for one year its 41st annual convention which was scheduled to be held in Toronto, Ontario, on October 20-22. Efforts will be made to distribute to the members those committee reports which are completed, while arrangements were made to set up several additional committees to investigate new subjects, all of which reports will be presented at the next convention, which is scheduled to be held in Toronto on October 18-20, 1932. The elimination of the convention of this association for this year constitutes the first interruption in the meetings of this organization since it first met in 1891.

Milo, Me., Commerce Body Not Opposing Rate Rise

In the report of the Interstate Commerce Commission hearing in the increased rates case at Portland, Me., appearing in the *Railway Age* of August 8, page 213, it was stated that Andrew P. Lane, traffic manager of the Great Northern Paper Co., representing the St. Croix Paper Co., the Pejepscot Paper Co., and the Chambers of Commerce of Milo and Millinocket, appeared in opposition to the increase. It appears that this report was in error. Mr. Lane was authorized to represent the Town of Millinocket and Madison. The Chamber of Commerce of Milo has not gone on record at any of its meetings as being against an increase in freight rates.

Mexico Taxes Motor Vehicles

The Mexican government has recently passed a law providing for the taxation of motor buses and trucks operating outside of the Federal District. It is thought that the new law may limit the competition which these agencies are offering the railways, which is said to be growing quite strong in the states surrounding the Federal District and at other points. The tax amounts to 2 per cent of the gross earnings of freight trucks and 5 per cent of those of highway passenger vehicles, with a minimum of $12 per month for trucks up to 3 tons capacity, and of the same amount for buses up to a capacity of 12 passengers.

Loss and Damage Decreases 26.5 Per Cent

Claims paid by the railroads for loss and damage during the first six months of 1931 decreased $5,115,273, or 26.5 per cent, as compared with the corresponding period of 1930, according to figures compiled by the Freight Claim division, A. R. A. The total in 1931 was $14,159,626, as compared with $19,274,899 during the same period last year.

The outstanding accomplishment of loss and damage prevention work during the first five months of this year was a reduction of $985,028 in loss and damage to fresh fruits and vegetables, which was accomplished in the face of the largest fruit crop since the peak of 1926.

Injunction Against St. Louis Trucking Contract

Federal Judge Otis at Kansas City, Mo., on August 26, issued a temporary injunction, blocking the plan of the Terminal Railroad Association of St. Louis to divert all trucking of less than carload freight in St. Louis to the Columbia Terminal Company of St. Louis, effective September 1. The injunction was issued on a petition filed by the Central Transfer Company of St. Louis.

The petition states that the Central Company now handles 25 per cent of all the freight trucking in St. Louis or more than half of the l.c.l. shipments and maintains four stations at which railroad bills of lading are issued. The Columbia Terminals Company has nine such stations in St. Louis and East St. Louis.

T. & N. O. Plans Hudson Bay Townsite

The Temiskaming & Northern Ontario Railway Commission met at North Bay, Ont., on August 27, to consider details in connection with the construction of a townsite and terminal facilities at Moose Harbor, the Hudson Bay terminus of the railway's new northerly extension and Ontario's only seaport, according to a recent announcement by George W. Lee, chairman of the commission. Under present plans, the terminal town will be located on the Moose river, on an 830-acre tract, of which 300 acres will be cleared to provide for railway facilities, streets, parks, a 75- or 100-guest hotel, and building lots, which will be held by the railway and disposed of next spring. Official opening of the new T. & N. O. extension, which has been completed to Hudson Bay, will be deferred until July or August, 1932.

New Jersey Board Launches Grade Separation Program

Elimination of 41 dangerous railway-highway grade crossings throughout the state of New Jersey, at an estimated total cost of approximately $19,730,000, has been ordered by the New Jersey Board of Public Utility Commissioners under the terms of the Davis act, which provides that the cost of such work shall be divided equally between the state and the railroad affected. In addition, the abolition of 16 other crossings, at a cost of about $4,000,000, is under consideration by the board. In both cases, the state's share of the cost would be paid from a $100,000,000 bond issue voted last November, the utilities commission being authorized to draw up a nine-year plan of grade separation, spending $2,000,000 a year.

Of the 41 crossings definitely affected, 21 are on the Central of New Jersey, in Elizabeth (see *Railway Age* of July 18, page 112), and 12 on the Pennsylvania and Reading in Atlantic City, the original order for the elimination of these crossings having been reported in the *Railway Age* of June 6, page 1132.

R. W. Beckman Takes New Iowa State College Post

Richard W. Beckman, who has been a member of the editorial staff of *Railway Age* since 1926, has resigned to join the faculty of the technical journalism department of Iowa State College, Ames, Iowa. As an assistant professor, Mr. Beckman will have charge of all classes in journalism for engineering students. Iowa State College is the first school in the country to employ a full-time professor of engineering journalism. It is anticipated that there will be a considerable enrollment of journalism students in one or two classes in engineering journalism and that there will be a small group of engineers who will be professionally interested in journalism. The course is designed to prepare students for editorial positions with engineering publications, and for advertising and publicity positions with engineering industries.

Mr. Beckman was graduated from Iowa State College with a degree in civil engineering in the class of 1925. During the following year he was employed on the news staff of the Des Moines (Iowa) Register. He joined the editorial staff of *Railway Age* in September, 1926, as an associate editor.

I. C. C. Makes Another Easy Recapture

The Interstate Commerce Commission on August 28 issued its second final successful recapture order. It was in the case of the Tuckerton Railroad, which operates a 32-mile line from Whitings, N. J., to Tuckerton. The commission finds the road to have earned $3,899 in excess of 6 per cent in 1921 and 1925 on a value of $610,000 for 1921 and of $600,000 for 1925. As the railroad had voluntarily paid $4,113 as half of the excess on its own estimates it was found to be entitled to a refund of $2,154. In the other years from 1920 to 1928 the company earned considerably less than 6 per cent, but it filed no protest and the tentative order of February 20 was made final.

This brings the amount of the commission's available recapture fund up to $10,190, of which $1,949 was contributed by the Tuckerton and $8,241 by the Wyandotte Terminal, which also remitted without protest the amount found to be due in a tentative report.

The commission also has a fund of some $10,000,000, less the refund to the Tuckerton, which has been paid voluntarily but usually under protest or with reservations, and for that reason is not available for use; and also because the amount of the liability for each road has not yet been finally fixed by the commission.

New York State to Sue U. S. on Whitestone Abandonment

The state of New York, through John J. Bennett, Jr., attorney general, has begun suit in federal courts to enjoin the United States and the Long Island Railroad from putting into effect an order of the Interstate Commerce Commission per-

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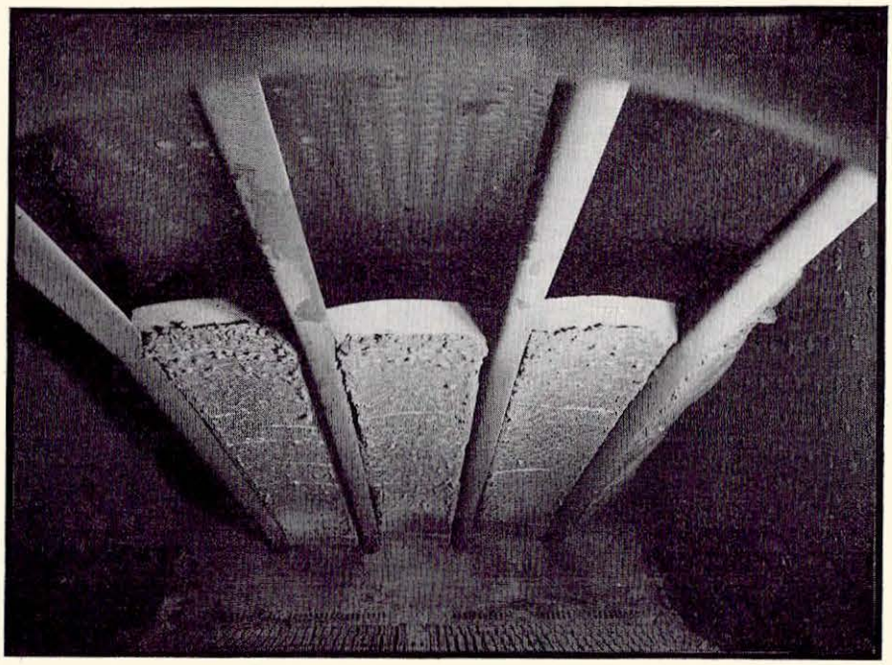

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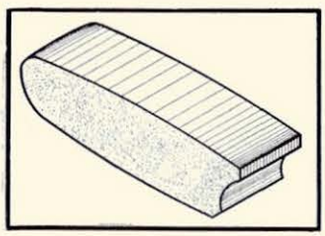
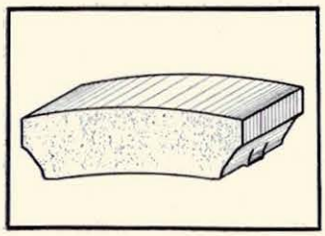
has given greatly improved service on MODERN *Power . . .*



New "Heavy Duty" Reversible Side Brick



New "Heavy Duty" Middle Brick

MODERN LOCOMOTIVES have introduced more difficult operating conditions for the locomotive Arch.

Sudden draft changes, excessive vibration and continuous operation have proved destructive to the conventional Arch design.

Following its program of continuous research, the Americn Arch Company has now developed a "Heavy Duty" Arch especially for modern power.

Where brick renewals with the conventional locomotive Arch were necessary at too frequent intervals, the "Heavy Duty" Arch shown above ran satisfactorily between washout periods.

Ask American Arch Company about the application of the new "Heavy Duty" Arch to your own modern power.

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60 East 42nd Street . . . . New York, N. Y.

Locomotive Combustion Specialists

mitting the railroad to abandon its 4.1-mile Whitestone branch, according to newspaper reports. The commission originally authorized abandonment of the branch on April 10, 1930, on condition that the Long Island provide adequate highway service, or some other substitute for rail service. The railroad, however, was unable to secure from the city of New York permission to establish motor coach and truck routes in place of trains, while the city also refused to extend its rapid transit lines to the Whitestone district, on the ground that the cost would be excessive, with the result that, following a rehearing, the Interstate Commerce Commission gave the Long Island permission to abandon the branch, unconditionally, on October 15, 1931.

In the present suit, the attorney general of New York is asking for an order convening a special statutory court to pass on the matter, and for an injunction to remain in effect until the suit is finally decided.

Heavy Rains Block Traffic on National of Mexico

During the latter part of August, traffic on several divisions of the National of Mexico was delayed considerably by washouts and landslides caused by heavy rains. These conditions prevailed particularly on the Golfo, Cardenas, Puebla, Guadalajara and Sureste divisions, the latter division comprising the Pan-American, Nacional de Tehuantepec and Vera Cruz al Istmo divisions. Traffic on the Southern Pacific of Mexico also suffered considerably, no train movements being permitted north of Nogales, Ariz.

Two New England States Act To Curb Reckless Bus Operation

Motor vehicle departments of Rhode Island and Connecticut have recently moved to curb the reckless operation of buses on interstate routes through those states. Recent reports, published in the United States Daily, reveal that the Rhode Island State Board of Public Roads has suspended the licenses of 29 interstate bus drivers and that the Connecticut motor vehicle commissioner has issued a notice reminding the police of that State that in the absence of regulatory legislation by Congress the Connecticut laws apply to interstate buses as well as to other motor vehicles.

Action on the part of these two New England states follows that of the New Jersey commissioner of motor vehicles who recently ordered summary arrest for interstate bus operators violating the New Jersey Traffic Act. (See *Railway Age* of August 22, page 301.)

The Rhode Island Board's action was based upon improper use and operation according to the record of suspensions made public. More specifically, George R. Wellington, chief clerk of the Board, stated orally that the men were deprived of their permits for excessive speeding.

Secret investigations by the Board's agents, Mr. Wellington stated, show that the operators were running with passengers aboard at speeds ranging from 40 to 60 miles along the highway. All but four of them, he stated, were going 50 miles or faster.

Mr. Wellington denied that the bus company schedules were so arranged as to make it necessary for the operators to speed. There is nothing to that, he said, and the Board is satisfied that the operating companies are doing what they can to keep their drivers under control.

Twentieth Annual Safety Congress

The Twentieth Annual Safety Congress and Exposition, conducted by the National Safety Council, will be held on October 12-16, at the Stevens Hotel, Chicago. The program of the Steam Railroad section is as follows:

Tuesday Morning, October 13

Maintenance of Way Department's Responsibility, by F. J. Jerome, division engineer, New York Central.

The Transportation and Maintenance of Way Department's Joint Responsibilities, by R. S. Kniffen, trainmaster, Great Northern.

Afternoon Session

Address by Hon. Robert P. Lamont, secretary of commerce.

Report of Committee on Prevention of Railroad Highway Crossing Accidents: The Engineer's Responsibility, by J. L. Walsh, Missouri-Kansas-Texas; The Maintenance of Way Department's Responsibility, by C. T. Bailey, Oregon Shore Line; The Motor Driver's Responsibility, by Charles E. Hill, New York Central.

Wednesday Morning, October 14

Address by C. E. Carlson, president, Duluth, Missabe & Northern.

Address by Carl R. Gray, president, Union Pacific.

The Brakeman's Duties in Accident Prevention, by J. A. Massey, brakeman, Chesapeake & Ohio.

Train and Train Service Accidents, by M. M. Cronk, assistant superintendent, Pere Marquette.

Transportation Accidents and Their Prevention, by Claude J. Brown, superintendent, Missouri Pacific.

The Value of Organized Safety, by W. J. O'Brien, general manager, Indiana Harbor Belt.

Afternoon Session

Collisions and Derailments, by H. A. Parish, assistant to general manager, Chicago & North Western.

Train and Train Service Accidents, including Coupling, Operating Hand Brakes, Operating Switches, Getting on or off Locomotives or Cars, Struck or Run Over by Engine or Cars.

Thursday Morning, October 15

Guarding Mechanical Equipment, by W. Dean Keefer, National Safety Council.

The Motive Power Department's Responsibility, by C. G. Goff, master mechanic, Southern.

The Car Department's Responsibility, by P. A. Summers, general car foreman, Atchison, Topeka & Santa Fe.

The Stores Department's Responsibility, by C. L. Wakeman, general storekeeper, Wabash.

State Commission Denies Chicago Switching Rate Increase

The Illinois Commerce Commission, on August 26, denied the application of railroads for authority to increase switching rates in the Chicago district, ranging from 25 per cent upward, although the Interstate Commerce Commission had previously held that the railroad demands were reasonable and ordered them to place a new schedule of interstate rates in effect on or before November 10, 1931.

Early in 1927, the proposed rate increases were filed by the railroads. Both the Illinois Commerce Commission and the Interstate Commerce Commission suspended the schedules and since have held a number of joint hearings to determine the facts. In announcing its order, the state commission cited evidence showing that the Lowrey basis has benefited both the carriers and shippers and that the substantial increases proposed by the railroads would result in the diversion of traffic to the highways and waterways. Coincident with the denial of the rate increases in the Chicago switching district, the state commission also denied the railroads' request to increase the rates from Chicago Heights to the Chicago switching district. The commission declared that the evidence in its possession would not support the increase.

According to the state commission, 53.3 per cent of the total traffic involved in the case is Illinois intrastate traffic, and 0.4 per cent is Indiana intrastate traffic, leaving the interstate traffic 40.3 per cent.

On the same date, the Public Service Commission of Indiana, which has been considering the case in conjunction with the Illinois Commerce Commission, likewise denied the increases in that portion of the Chicago switching territory which lies in Indiana.

"Safety First" Becomes of Age

"Safety First" may be said to have come of age, in railroad practice; it was in 1910 (*Railway Age Gazette*, September 2, 1910, page 391) that the world first heard of the pioneer activities of R. C. Richards on the Chicago & North Western. He took his cue from the coal mines. Mr. Richards' notable service is commemorated by a tablet in the Chicago & North Western station at Chicago. This 21 years' history has this year been summed up succinctly by Charles E. Hill, general safety agent of the New York Central Line and vice-chairman of the Safety Section, A.R.A., in the "Central Manufacturing District Magazine" (Chicago) for August. Speaking to a non-railroad audience Mr. Hill brings out numerous points which railroad men, because of their short perspective, may sometimes overlook. When we read that in 1913 there were 3,715 employees killed on the railroads of the country (1,689 more than in 1923, and 2,780 more than in 1930) we are amazed that we sat calm under such a disgrace. Perhaps, however, our lethargy was not so strange; for today we continue almost totally helpless under a record of people killed on the highways of the country totaling *thirty-three thousand* in one year!

Mr. Hill starts his history from the beginning, and he reminds us that railroad managers have necessarily been safety specialists from the very first movement of locomotives; though some of them have been rather slow to learn. He digs up a safety circular issued by the New York & New Haven in 1850. It was an exhortation to farmers to keep their cattle off the track on Sundays, as the railroad might possibly have to run a train on that day.

This article rightly stresses the point that the remarkable diminution in the records of killed and injured during the past 21 years has been brought about by *an organization*. Much of the safety committees' work is really done at very long range, and only by the massed momentum of the efforts of scores or hundreds of individuals (*organized*) can the results be made sufficiently evident to keep the whole body of responsible officers and employees

Continued on Next Left Hand Page

Where Are We Headed?

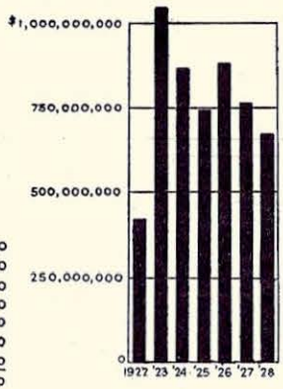
RAILROAD TRANSPORTATION PROGRESS IN THE UNITED STATES

DURING 10 YEARS : 1920 - 1929

UNLESS OTHERWISE STATED ALL DATA RELATE TO CLASS I RAILWAYS

GROSS CAPITAL EXPENDITURES AND THEIR DISTRIBUTION IN THE RAILROAD PLANT - U. S. A.

GROSS CAPITAL EXPENDITURES 1922 - 1928

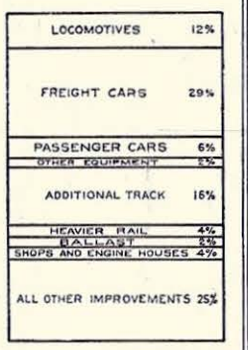


YEAR	
1922	$ 429,273,000
1923	1,059,149,000
1924	874,744,000
1925	748,191,000
1926	885,086,000
1927	771,552,000
1928	676,665,000
TOTAL	$ 5,444,660,000

DISTRIBUTION OF GROSS CAPITAL EXPENDITURES: 1922 - 1928

EQUIPMENT	
LOCOMOTIVES	$ 649,311,000
FREIGHT TRAIN CARS	1,566,244,000
PASSENGER TRAIN CARS	305,590,000
OTHER EQUIPMENT	122,734,000
TOTAL EQUIPMENT	$ 2,643,879,000

ROADWAY & STRUCTURES	
ADDITIONAL TRACK AND TRACK MATERIAL	$ 843,981,000
HEAVIER RAIL	242,848,000
ADDITIONAL BALLAST	85,879,000
SHOPS & ENGINE HOUSES	242,470,000
ALL OTHER IMPROVEMENTS	$ 1,385,603,000
TOTAL - ROADWAY & STRUCTURES	$ 2,800,781,000
TOTAL	$ 5,444,660,000



CYRUS FOGG BRACKETT LECTURE
PRINCETON UNIVERSITY
APRIL 14, 1931

PLATE (7)

AMERICAN LOCOMOTIVE COMPANY
NEW YORK

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WHEN we consider what the locomotive designer has done in improving the locomotive as a whole in order to meet the conditions which are facing the railroads today, we cannot help but wonder why only 12 per cent of the expenditures shown in the above chart was for locomotives.

Of course, these figures ended with the year 1928—so let us bring them more up to date.

In 1929, $853,721,000 was spent in improving and enlarging railway properties. And, lo-and-behold, we find that the total expenditures for locomotives over the whole period, 1922 to 1929, has been reduced to 11 per cent!

Furthermore, we can positively predict that when the figures for 1930 and 1931 are added, this percentage is going lower yet.

The locomotive is the heart of the railroads' being. Therefore, if the future of our railroads depends upon their ability to provide the most economical and convenient transportation available, one might well ask "Where are we headed?"

American Locomotive Company

30 Church Street New York N.Y.

thoroughly aroused. The safety organization is a vital feature in the conservation of lives—and of property as well. And today, with the spirit of emulation developed to an extent hardly thought of in Mr. Richards' day, the railroad men of the country are each year carrying their conquests over carelessness to records nearer and nearer perfection.

Canadian Express Lines Meet Truck Competitors' Rates

The Canadian express companies have recently filed with the Railway Commission of Canada new tariffs affecting more than 300 places in all provinces where it is known that truck lines have taken the heavier and more desirable traffic. The new rates are approximately the same as the truckers have been charging. It is planned to extend these rates to other places throughout the Dominion.

"This represents an honest effort on the part of express companies," said T. E. McDonnell, president and general manager of the Canadian Pacific Express Company, "to meet a serious competitive situation which never should have been permitted to exist. While it is true that the truckers have taken perhaps more traffic from the freight departments of the railways than they have taken from the express companies, the express companies seem to be better able to compete, because the express companies can give pick-up and delivery service with their own vehicles combined with fast passenger train movement.

"Truck rates in the past have been lower than express rates," he continued, "because part of the cost of performing truck service is absorbed in general taxes and need not be included in the price of truck service, and because truckers are permitted to discriminate between shippers by charging secret rates to favored shippers. It is difficult to secure reliable information as to what secret rates are used but to the extent that it is possible and to the extent that it can be done without loss, the express companies have decided to meet the demand of shippers for competitive rates."

Mr. McDonnell expressed the opinion that regulation of trucks would eventually come. In the meantime, however, the express companies propose to meet conditions as they are, insofar as it is possible to do so.

September Club Meetings

The Central Railway Club of Buffalo will hold its regular meeting on Thursday evening, September 10, at Hotel Statler, Buffalo, N. Y. C. F. McTague will speak on "Buffalo and the Railroads" and W. H. Dominick on "Passenger Service of the Future." This will be Lackawanna Railroad night and music will be furnished by the Lackawanna Glee Club of Scranton. The meeting will be followed by dancing and a buffet luncheon.

The Cincinnati Railway Club will hold its next meeting on Tuesday evening, September 8, at Hotel Gibson, Cincinnati, Ohio. George W. Usherwood will speak on the Coffin Feedwater Heater. There will be a dinner at six o'clock and there is also to be a picture and musical entertainment.

The Canadian Railway Club will hold its next meeting on Monday evening, September 14, at the Windsor Hotel, Montreal. Chairman Norman of the city's Industrial Commission on Unemployment will present motion pictures describing the work of the commission.

The Southern & Southwestern Railway Club will hold its annual outing at Savannah on Thursday and Friday, September 17 and 18. Headquarters will be at the DeSoto Hotel.

The Car Foremen's Association of Chicago will hold its next meeting at the Great Northern Hotel, Chicago, on Monday evening, September 14. The speaker will be T. W. Demarest, general superintendent of Motive Power of the Pennsylvania.

The Car Foremen's Association of St. Louis will hold its next meeting on the evening of September 9, at the American Hotel Annex, St. Louis, Mo.

The Car Foreman's Association of Omaha, etc., will hold its next meeting at Council Bluffs, Iowa, on Thursday, September 10, at 2 p.m. T. P. Schmidt, car foreman, C. M. St. P. & P., will speak on safety.

The Canadian Lines in July

Although the Canadian Pacific was able to effect the substantial saving of $2,134,159 in its operating expenses during the month of July, the decline in gross revenues for the month was heavy and as a result net revenues for July show a reduction of $1,330,888 from the corresponding period of last year. This latest reduction in net brings the total reduction for the seven months to $2,753,698; during the same period the system effected a reduction in its operating expenses of $15,281,945 from the like period of 1930.

Gross for July totalled $11,876,230, against $15,341,278 in July, 1930. Expenses were $9,957,060, against $12,091,219, leaving net at $1,919,169, against $3,250,058. Seven months gross totalled $82,381,448, a reduction of $18,035,644. Expenses were cut $15,281,945 to $72,324,159, leaving net for the period $10,057,288, against $12,810,987 in the first seven months of 1930.

Net operating revenue of $335,618 for the month of July is shown in the monthly statement of the Canadian National. The policy of reducing expenses placed in effect by the management resulted in a decrease in operating expenses for July as compared with July, 1930, of $2,395,079.

Gross revenues in July, 1931 were $14,807,474, a decrease of $4,342,676 as compared with July, 1930. Operating expenses for July, 1931, were $14,471,855, a decrease of $2,395,079 as compared with the corresponding month of last year. Net revenue for the month of July, 1931, was $335,618, a decrease of $1,947,596 as against that of July, 1930.

For the period from January 1 to the end of July, 1931, gross revenues were $103,083,100, a decrease of $25,978,141 as against the same period of 1930. Operating expenses for the 1931 period were $101,418,446, a decrease of $13,965,670, and net revenue $1,664,653, a decrease of $12,012,470 as against the similar period of 1930.

Railway Employees in Mexico Protest Force Reductions

Unemployment relief, the re-organization of the railways and the new labor law were discussed at a recent meeting of the Alliance of Railroad Employees of the Mexican railways, held at Mexico City. Railway representatives from all parts of the country participated in the meeting. Owing to the acute unemployment situation among railway employees, the view was expressed that the railways should release the least possible number of employees, since, although three months' salary is paid to those that are laid off, released employees are usually unable to find work elsewhere.

The railroad section of the new labor law, which has been promulgated and passed by both houses of the government, authorizes the railroads to employ foreigners to fill executive and supervisory positions, which, heretofore, has been prohibited. Moreover, the new law specifies that the roads may decline to permit chief clerks, secretaries and employees in such positions to be included in the seniority lists, whereas, heretofore, chief clerks were members of unions and were shown in the seniority lists. Consequently, it was their duty to represent and defend the employees in their grievances against the railroads, instead of supporting the employer. The law also requires that, in the event of a strike, sufficient workers to guarantee the proper maintenance of the property must continue with their work even if no operations are conducted.

Another important development in Mexico is the announced intention of the National Railways to establish one seniority list for the whole system. This move is opposed by the two most important unions of trainmen, that of the enginemen and firemen and that of the conductors and brakemen, on the ground that it would cause the workers to be moved constantly back and forth over the system, as is not the case when seniority lists are maintained on the respective divisions. These unions are unwilling to accept the rule and have taken the matter up with the arbitration committee, which consists of delegates from the government, the railroads and the unions.

Adequate Railway Rates Urged by Otto H. Kahn

(Continued from page 375)

fairness and effectiveness of its operation would be promoted if railroad service were accorded more adequate compensation, if the railroads were relieved from certain unduly hampering restraints, now imposed upon them by legislation enacted from time to time, and also if the rigidity and inherent cumbersomeness of minute commission rules and regulations could be

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Ribbons of Steel That Are Measures of Profits

To cut just a little deeper, just a little faster; how often this would turn a loss into a profit in a machining operation. Perhaps the steel you are using would make the difference. Illinois Alloys can be machined rapidly, can be cut deeply because they are homogeneous and uniform in structure, as a result of production that is ever under the watchful eye of metallurgists. These metallurgists will help you solve your alloy problems.

Illinois Steel Company
SUBSIDIARY OF UNITED STATES STEEL CORPORATION
208 South La Salle Street, Chicago, Ill.

ILLINOIS *alloy* STEEL

relaxed somewhat in favor of enhanced elasticity of action and initiative for the managements.

"It would also seem logical and desirable that the legal status of the railroads in respect of water transportation should be brought under like jurisdiction and regulation as the railroads, that the government, having no accounting to make, no taxes to pay and no losses to fear, should not compete with the railroads in the way it now does through canals, and that, as far as practicable, a nearer approach to reasonable parity in the burden of taxation be established between railroads and any other forms of transportation.

"On the other hand, it would appear that railroad managements might advantageously consider ways and means (which I understand they are at liberty to adopt under the existing law) for restraining the ardor of competitive practices and thus avoiding undue costs to themselves, without thereby depriving the shippers and the public at large of any real advantage."

Meetings & Conventions

The following list gives names of secretaries, date of next or regular meetings and places of meetings.

AIR BRAKE ASSOCIATION—T. L. Burton, Room 5605, Grand Central Terminal Building, New York City.

ALLIED RAILWAY SUPPLY ASSOCIATION.—F. W. Venton, Crane Company, 836 S. Michigan Blvd., Chicago. To meet with Air Brake Association, Car Department Officers Association, International Railroad Master Blacksmiths' Association, International Railway Fuel Association, International Railway General Foremen's Association, Master Boiler Makers Association and the Traveling Engineers' Association.

AMERICAN ASSOCIATION OF FREIGHT TRAFFIC OFFICERS.—W. R. Curtis, F. T. R., M. & O. R. R., Chicago, Ill.

AMERICAN ASSOCIATION OF GENERAL BAGGAGE AGENTS.—E. L. Duncan, 332 S. Michigan Ave., Chicago.

AMERICAN ASSOCIATION OF PASSENGER TRAFFIC OFFICERS.—W. C. Hope, C. R. R. of N. J. 143 Liberty St., New York. Next Convention, October 20-21, 1931, Edgewater Beach Hotel, Chicago.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—F. O. Whiteman, Room 800, 1017 Olive St., St. Louis, Mo. Next meeting, 1932, Detroit, Mich.

AMERICAN ASSOCIATION OF SUPERINTENDENTS OF DINING CARS.—F. R. Borger, C. I. & L. R. R., 836 Federal St., Chicago. Next convention, October 20-22, 1931, Chicago.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—Guy C. Hecker, 292 Madison Ave., New York. Next convention, September 26-October 2, 1931, Auditorium, Atlantic City, N. J.

AMERICAN RAILWAY ASSOCIATION.—H. J. Forster, 30 Vesey St., New York, N. Y.
Division I.—Operating.—J. C. Caviston, 30 Vesey St., New York, N. Y.
Freight Station Section. — R. O. Wells, Freight Agent, Illinois Central Railroad. Chicago.
Medical and Surgical Section.—J. C. Caviston, 30 Vesey St., New York.
Protective Section.—J. C. Caviston, 30 Vesey St., New York.
Safety Section.—J. C. Caviston, 30 Vesey St., New York.
Telegraph and Telephone Section.—W. A. Fairbanks, 30 Vesey St., New York.
Division II.—Transportation.—G. W. Covert, 59 East Van Buren St., Chicago.
Division III.—Traffic.—J. Gottschalk, 143 Liberty St., New York.
Division IV.—Engineering.—E. H. Fritch, 59 East Van Buren St., Chicago. Next meeting, March 15-17, 1932, Palmer House, Chicago. Exhibit by National Railway Appliances Association.
Construction and Maintenance Section.—E. H. Fritch. Next meeting, March 15-17, 1932, Palmer House, Chicago.
Electrical Section.—E. H. Fritch.
Signal Section.—R. H. C. Balliet, 30 Vesey St., New York.
Division V.—Mechanical.—V. R. Hawthorne, 59, East Van Buren St., Chicago.
Equipment Painting Section.—V. R. Hawthorne, 59 East Van Buren St., Chicago.
Division VI.—Purchases and Stores.—W. J. Farrell, 30 Vesey St., New York, N. Y.
Division VII.—Freight Claims.—Lewis Pilcher, 59 East Van Buren St., Chicago.
Division VIII.—Motor Transport.—George M. Campbell, 30 Vesey St., New York, N. Y. Annual Meeting, October 27-28, 1931, Hotel Stevens, Chicago.
Car Service Division.—C. A. Buch, 17th and H. Sts., N. W., Washington, D. C.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W. Ry., 319 N. Waller Ave., Chicago. Next convention, October 20-21, 1932, Toronto, Ont. Exhibit by Bridge and Building Supply Men's Association.

AMERICAN RAILWAY DEVELOPMENT ASSOCIATION.—A. W. Large, Gen. Agri. Agt., C. R. I. & P. Ry., Chicago, Ill. Semi-annual meeting, December 3-4, 1931, Hotel Sherman, Chicago; annual meeting, June 15-17, 1932, Brown Hotel, Louisville, Ky.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—Works in co-operation with the American Railway Association, Division IV.—E. H. Fritch, 59 East Van Buren St., Chicago. Next meeting, March 15-17, 1932, Palmer House, Chicago. Exhibit by National Railway Appliances Association.

AMERICAN RAILWAY MAGAZINE EDITORS ASSOCIATION.—Miss E. Kramer, M-K-T Employes Magazine, St. Louis, Mo. Next convention, April, 1932, San Antonio, Tex.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—G. G. Macina, C., M., St. P. & P. R. R., 11402 Calumet Ave., Chicago. Exhibit by Supply Association of the American Railway Tool Foremen's Association.—E. E. Caswell, Union Twist Drill Co., 11 S. Clinton St., Chicago.

AMERICAN SHORT LINE RAILROAD ASSOCIATION.—R. E. Schindler, Secretary, Union Trust Bldg., Washington, D. C.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. Railroad Division, Paul D. Mallay, Johns-Manville Corp., 292 Madison Ave., New York.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—H. L. Dawson, 1104 Chandler Building, Washington, D. C. Next meeting, January 26-28, 1932, Hotel Jefferson, St. Louis, Mo.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—H. D. Morris, District Claim Agent, Northern Pacific Ry., St. Paul, Minn. Annual convention, May, 1932, Louisville, Ky.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W., Room 411, C. & N. W. Station, Chicago. Exhibit by Railway Electrical Supply Manufacturers' Association.

ASSOCIATION OF RAILWAY EXECUTIVES.—Stanley J. Strong, Transportation Building, Washington, D. C.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—S. A. Baber, High Grade Manufacturing Co., 10418 St. Clair Ave., Cleveland, Ohio. Meets with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—C. R. Crook, 2276 Wilson Ave., N. D. G., Montreal, Que. Regular meetings, 2nd Monday in each month, except June, July and August, Windsor Hotel, Montreal, Que.

CAR DEPARTMENT OFFICERS ASSOCIATION.—A. S. Sternberg, M. C. B. Belt Ry. of Chicago, 7926 South Morgan Street, Chicago.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—G. K. Oliver, 2514 W. 55th St., Chicago. Regular meetings, 2nd Monday in month, except June, July, and August, Great Northern Hotel, Chicago.

CAR FOREMEN'S ASSOCIATION OF LOS ANGELES.—J. W. Krause, Room 299, 610 So. Main St., Los Angeles, Cal. Regular meetings, 2nd Monday of each month, except July, August and September, Room 299, 610 So. Main St., Los Angeles.

CAR FOREMEN'S ASSOCIATION OF ST. LOUIS, MO.—F. G. Wiegman, 720 N. 23rd St., East St. Louis, Ill. Meetings first Tuesday of each month, except July and August, American Hotel Annex, 6th and Market Sts., St. Louis, Mo.

CENTRAL RAILWAY CLUB OF BUFFALO.—T. J. O'Donnell, 1817 Hotel Statler, McKinley Square, Buffalo, N. Y. Regular meetings, 2nd Thursday each month, except June, July, August, Hotel Statler, Buffalo, N. Y.

CINCINNATI RAILWAY CLUB.—D. R. Boyd, 453 E. 6th St., Cincinnati, Ohio. Meetings 2nd Tuesday in February, May, September and November, Hotel Gibson, Cincinnati, O.

CLEVELAND RAILWAY CLUB.—F. L. Frericks, 14416 Alder Ave., Cleveland, Ohio. Meetings, second Monday each month, except July, August, September, Auditorium, Brotherhood of Railroad Trainmen's Building, West 9th St., and Superior Ave., Cleveland.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—W. J. Mayer, Michigan Central R. R., Detroit, Mich.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. T. Winkless, Room 700 La Salle Street Station, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 1061 W. Wabasha St., Winona, Minn.

MASTER BOILER MAKERS ASSOCIATION.—A. F. Stiglmeier, 29 Parkwood St., Albany, N. Y.

MASTER CAR BUILDERS' AND SUPERVISORS' ASSOCIATION.—(See Car Department Officers' Association.)

NATIONAL ASSOCIATION OF RAILROAD AND UTILITIES COMMISSIONERS.—James B. Walker, 270 Madison Ave., New York. Annual convention, October 20-23, 1931, Jefferson Hotel, Richmond, Va.

NATIONAL ASSOCIATION OF RAILROAD TIE PRODUCERS.—Roy. M. Edmonds, 1252 Syndicate Trust Bldg., St. Louis, Mo.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—C. W. Kelly, 1014 South Michigan Ave., Chicago. Exhibit at A. R. E. A. convention.

NATIONAL SAFETY COUNCIL.—Steam Railroad Section: J. L. Walsh, Supt. Safety, M.-K.-T. R. R., Dallas, Tex. Annual congress October 12-16, 1931, Hotel Stevens, Chicago.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meetings, 2nd Tuesday in month, except June, July, August and September, Copley Plaza Hotel, Boston, Mass.

NEW YORK RAILROAD CLUB.—D. I. McKay, 26 Cortlandt St., New York. Regular meetings, 3rd Friday in month, except June, July and August, 29 W. 39th St., New York City.

PACIFIC RAILWAY CLUB.—W. S. Wollner, P. O. Box, 3275, San Francisco, Cal. Regular meetings 2nd Thursday in month, alternately in San Francisco and Oakland.

RAILWAY ACCOUNTING OFFICERS' ASSOCIATION.—E. R. Woodson, 1124 Woodward Building, Washington, D. C. Next convention, 1932, Buffalo, N. Y.

RAILWAY BUSINESS ASSOCIATION. — Frank W. Noxon, 1112 Shoreham Building, Washington, D. C. Next meeting, November, 1931, Chicago.

RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, 1841 Oliver Building, Pittsburgh, Pa., Regular meetings, 4th Thursday in each month except June, July and August, Fort Pitt Hotel, Pittsburgh, Pa.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION.—Edward Wray, 9 S. Clinton St., Chicago. Meets with Association of Railway Electrical Engineers.

RAILWAY FIRE PROTECTION ASSOCIATION.—R. R. Hackett, Baltimore & Ohio R. R. Baltimore, Md.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 1841 Oliver Bldg., Pittsburgh, Pa. Meets with Mechanical Division, Purchases and Stores Division and Motor Transport Division, American Railway Association. (No exhibit at 1931 meetings.)

RAILWAY TELEGRAPH AND TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 30 Church St., New York. Meets with Telegraph and Telephone Section of A. R. A. Division 1.

RAILWAY TREASURY OFFICERS' ASSOCIATION.—L. W. Cox, 1217 Commercial Trust Bldg., Philadelphia, Pa. Next convention, September 17-18, 1931, Statler Hotel, Buffalo, N. Y.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION. — T. F. Donahoe, Gen. Supvr. Road, Baltimore & Ohio, Pittsburgh, Pa. Next convention, September 20,-22, 1932, Hotel Stevens, Chicago. Exhibit by Track Supply Association.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Drawer 24, M. P. O., St. Louis, Mo. Regular meetings, 2nd Friday in month, except June, July and August. Statler Hotel, St. Louis.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, West Nyack (Rockland Co.), N. Y. Meets with A. R. A. Signal Section.

SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.—A. T. Miller, P. O. Box 1205, Atlanta, Ga. Regular meetings, 3rd Thursday in January, March, May, July, September and November. Ansley Hotel, Atlanta.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—R. G. Parks, A. B. & C. Ry., Atlanta, Ga.

SUPPLY MEN'S ASSOCIATION.—E. H. Hancock, Treasurer, Louisville Varnish Co., Louisville, Ky. Meets with A. R. A. Div. V. Equipment Painting Section.

TORONTO RAILWAY CLUB.—J. A. Murphy, 1405 Canadian National Express Building, Toronto. Regular meetings 3rd Monday of each month, except June, July and August, Royal York Hotel, Toronto, Ont.

TRACK SUPPLY ASSOCIATION.—L. C. Ryan, Oxweld Railroad Service Co., Carbon & Carbide Building, Chicago. Meets with Roadmasters' and Maintenance of Way Association.

TRAVELING ENGINEERS' ASSOCIATION. — W. O. Thompson, 1177 East 98th St., Cleveland, O.

WESTERN RAILWAY CLUB.—J. H. Nash, Dri-Steam Valve Sales Corp., 122 S. Michigan Ave., Chicago. Regular meetings 3rd Monday each month, except June, July, August and September, Hotel Sherman, Chicago.

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Engineers are hired to maintain

SCHEDULES . .

NOT *to nurse*

BOILER TUBES

Schedules assume that engines and rolling stock in general will perform as intended; and unless that condition is fulfilled, schedules may go by the board.

An engineer is kept busy enough when things are normal. Every hour spent nursing a half-sick or limping engine is a hard hour for him, even if it does not result in actual delays and schedule derangement.

The strength, toughness and durability which are embodied in NATIONAL-SHELBY Seamless Locomotive Boiler Tubes, not only cut down replacements but, what is even more important, they give maximum assurance against annoying and costly interruptions and delays. A description of these tubes and their fitness for all the most exacting requirements of railway service, will be mailed upon request. Ask for a copy of National Bulletin No. 12 describing NATIONAL-SHELBY—

America's Standard Boiler Tubes

NATIONAL TUBE COMPANY

Frick Building, Pittsburgh, Pa.

QUALITY PRODUCTS — *Dependable Service*

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

PRINCIPAL SUBSIDIARY MANUFACTURING COMPANIES

American Bridge Company			Oil Well Supply Company
American Sheet and Tin Plate Company	Columbia Steel Company	Illinois Steel Company	The Lorain Steel Company
American Steel and Wire Company	Cyclone Fence Company	Minnesota Steel Company	Tennessee Coal, Iron & R. R. Company
Carnegie Steel Company	Federal Shipbuilding and Dry Dock Company	National Tube Company	Universal Atlas Cement Company

Pacific Coast Distributors—Columbia Steel Company, Russ Building, San Francisco, Calif. *Export Distributors*—United States Steel Products Company, 30 Church Street, New York, N. Y.

Equipment and Supplies

PASSENGER CARS

THE GUANTANAMO & WESTERN (Cuba) has ordered from the J. G. Brill Company, through the Mack-International Motor Truck Corporation, five pony trucks to be applied to Mack rail car chassis, model AB, now on order for this railroad.

THE BOARD OF TRANSPORTATION, CITY OF NEW YORK, which was reported in the *Railway Age* of August 22 as planning to advertise for prices on from 300 to 1,500 steel passenger cars for subway service, has now issued a definite inquiry for those cars. Bids have been called for September 25, on lots of 300, 500, 1,000 and 1,500 cars.

MOTOR COACHES

THE NEW ENGLAND TRANSPORTATION COMPANY has received eight type 250, 33-passenger observation Yellow coaches from the General Motors Truck Company.

THE MISSOURI PACIFIC TRANSPORTATION COMPANY has received three type 250, 33-passenger observation Yellow coaches from the General Motors Truck Company.

IRON & STEEL

THE ERIE has ordered 250 tons of structural steel for a bridge at Kent, Ohio, from the American Bridge Company.

THE OREGON-WASHINGTON RAILROAD & NAVIGATION CO. has ordered 100 tons of structural steel for miscellaneous bridge work from the Wallace Bridge & Structural Steel Company.

THE CINCINNATI UNION TERMINAL COMPANY has ordered 3,152 tons of rail from the United States Steel Corporation and 1,454 tons from the Inland Steel Company. In addition, 7,800 steel rail joints have been ordered from the Rail Joint Company, 276,000 tie plates from the Carnegie Steel Company and 2,940 kegs of spikes from the Bethlehem Steel Company.

THE ITALIAN STATE RAILWAYS have recently instituted an express service for the handling of packages on fast passenger trains, according to recent reports made public by the United States Department of Commerce.

Packages weighing up to 30 kilograms (66 pounds) are handled at rates varying with weight and distance, the former being divided into three categories of 10, 20 and 30 kilograms and the latter into seven zones varying from 100 to 1,000 kilometers (about 62 to 620 miles). Rates vary from 26 cents to $1.75.

Supply Trade

William B. Turner, division sales manager of the **Truscon Steel Company** at Youngstown, Ohio, has retired.

E. H. Batchelder, Jr., has been appointed sales manager of the **Servicised Products Corporation,** with headquarters at Chicago.

Otis B. Duncan, Chicago, has been appointed railroad representative for the **Northwestern Manufacturing Company,** Milwaukee, Wis.

Henry M. Toch, chairman of the board of **Standard Varnish Works** and president of **Toch Brothers, Inc.,** retired from the latter position on September 1, after more than 50 years of active service, but will continue in an advisory capacity as director and chairman of the board of Standard Varnish Works. **Dr. Maximilian Toch** will succeed Mr. H. M. Toch as president of Toch Brothers, Inc., and will also continue as vice-president of Standard Varnish Works.

An arrangement has been made between the **Carrier Engineering Corporation,** Newark, N. J., the **Safety Car Heating & Lighting Company,** and the **Vapor Car Heating Company, Inc.,** for the sale and servicing of air-conditioning equipment to railroads. The Safety Car Heating & Lighting Company will function as the sales distributor of the Carrier air-conditioning and cooling system and will continue to handle lighting and heating equipment. It will aiso handle the servicing of the air-conditioning and cooling systems. The Vapor Car Heating Company, Inc., will continue the development and manufacture of heating equipment and its adaptation to air conditioning. The Carrier Engineering Corporation will contribute its research and engineering facilities to the design and manufacture of standardized cooling and air-conditioning systems for railway service. A demonstration of a new type of cooling and air-conditioning system for railroad trains was held under the auspices of these three companies at the plant and laboratory of the Carrier Research Corporation, 850 Frelinghuysen avenue, Newark, on August 21 and 22.

R. S. Folk has resigned as sales representative of the Auxiliary Locomotive Division of the **Bethlehem Steel Company** at New York to become railroad representative of the **York Ice Machinery Corporation** at York Pa. Mr. Folk, who will handle the sale of air-conditioning equipment for passenger-train service, was born in 1887 at Baltimore, Md. He was educated in a private school and in 1906 was graduated from the Baltimore Polytechnic Institute. He then worked for two years in the shop of the Baltimore Bridge Company, where he completed a course covering all departments in bridge construction. For the next two years he was a draftsman in the engineering department of the Baltimore Bridge Company. He then entered the bridge department of the American Bridge Company at Pittsburgh, Pa. as a designer on bridge and erecting work. Resigning six years later, he was appointed structural sales engineer of the Bethlehem Steel Company at Chicago. He remained in the latter position for three years and for the next two years was sales agent of the General Fireproofing Company at Cleveland, Ohio. He then returned for the Bethlehem Steel Company in charge of the structural fabricating department. When that company took over from the Delaware & Hudson the manufacture and sale of the auxiliary locomotive, Mr. Folk was placed in charge of the sale of this product to all of the eastern railroads. After serving for five years in this capacity, he now becomes railroad representative of the York Ice Machinery Corporation.

Changes in the sales organization and additions to the staff of the **Worthington Pump & Machinery Corporation,** Harrison, N. J., as made effective within the past few weeks, include the appointments of **Otto Nonnenbruch,** for the past four years chief engineer of the Diesel department of I. P. Morris and De La Vergne, Inc., Philadelphia, Pa., as special sales representative with headquarters at Buffalo, N. Y., of **J. B. Allen,** formerly president of the Allen Engineering Company, Bridgeport, Conn., and prior to that time with the Sperry Gyroscope Company, Brooklyn, N. Y., as special marine representative for Worthington, with headquarters at Harrison, and of **H. G. Wood,** formerly assistant manager of the New England division of the Westinghouse Electric & Manufacturing Company, as electrical sales engineer. **E. M. Paullin, Jr.,** previously associated with the New York office of the General Electric Company as synchronous motor specialist, has been appointed electrical sales engineer at the Cincinnati, Ohio, works of the Worthington Corporation. **John T. Clancy,** assistant manager, Buffalo works sales division, has been transferred to Harrison, N. J.; **E. W. Hammond** has been transferred from Buffalo to Los Angeles, Cal., as special representative of Diesel and gas engine sales on the Pacific Coast, and **A. M. Boehm** has been appointed to a similar position at Kansas City, Mo., from the sales department of the Buffalo works. **Joseph F. Hecking,** formerly with the Diesel engine sales division in New York, has been assigned to the Diesel and gas engine sales division at Buffalo, and **William J. Daly,** assistant manager, Cincinnati works sales division, has been transferred to Pittsburgh, Pa., on special sales work. **G. A. Herrmann** and **W. R. Kennedy,** formerly sales engineers at Chicago and Pittsburgh, have been appointed acting district managers at St. Paul, Minn., and Kansas City, respectively.

Frank J. Baumis, formerly vice-president of Manning, Maxwell & Moore, Inc., and more recently with the Ingersoll-Rand Company, has organized the **F. J. Baumis Company,** with offices in New York and Boston, Mass. The new company will specialize in highway equipment for railroads and their affil-

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BETTER FIRES

FIREBAR CORPORATION
CLEVELAND OHIO.

iates, representing Warford Highway Transportation, manufacturers of motor truck chassis, and allied lines. Mr.

Frank J. Baumis

Baumis has had a long experience and close association with railroad operation and equipment problems.

OBITUARY

E. D. Jackson, general manager of the Syntron Company, Pittsburgh, Pa., died at Baltimore, Ohio, on August 17 following an operation.

Alfred H. Mulliken, formerly president of the Pettibone-Mulliken Company, Chicago, Ill., died suddenly at his home in New Canaan, Conn., on September 2. He was 77 years old.

TRADE PUBLICATION

CREOSOTED POLES.—The International Creosoting and Construction Company, Galveston, Texas, has issued a 16-page, illustrated booklet, setting forth the advantages of creosoted pine poles and pointing out especially the fact that by reason of advances in treating equipment and the science of timber preservation, the poles now treated will not "bleed" after being installed, and thereby damage the clothing of persons who may come in contact with them. As proof of this statement, the booklet lists some 1500 cities in the United States where creosoted pine poles are in service in streets of business and residential sections.

PLANS ARE NOW BEING DISCUSSED with the interested governments for a Paris-Warsaw-Berlin motor coach service to be inaugurated next year, according to reports from Berlin to the United States Department of Commerce. Present plans contemplate a Paris-Berlin running time of 30 hours and a fare equivalent to existing third-class railway passenger rates.

The report further states that the inauguration of the line has been delayed by the failure to obtain the consent of the governments involved and particularly the national railway systems. It is now believed, however, that this obstacle has been removed by providing for participation of the railways in the three national companies to be organized for the operation of the bus line.

Financial

CHICAGO, ROCK ISLAND & PACIFIC.—*Abandonment of Trackage Rights.*—This company has been authorized by the Interstate Commerce Commission to abandon operation under trackage rights over the Chicago, Burlington & Quincy between Cameron Junction, Mo., and Birmingham, 44.3 miles, following the completion of its own line into Kansas City from the northeast.

GULF, COLORADO & SANTE FE.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its operation under trackage rights over the St. Louis Southwestern between McGregor, Tex., and Waco, 21.78 miles.

LEHIGH VALLEY.—*Omits Common Dividend.*—The directors of this company have omitted the regular quarterly dividend of 62½ cents due on the common stock at this time. Payments at this rate were made in March and June (i.e., a rate of $2.50 per annum, or 5 per cent, on $50 par stock). Prior to March the dividend was on an annual basis of $3.50, or 7 per cent. The largest holders of the stock are the Pennsylvania and the Wabash.

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—*Securities.*—The Interstate Commerce Commission has authorized this company to issue $10,000,000 of one year 5 per cent secured notes and to pledge as collateral security therefor $12,500,000 of first refunding mortgages 5½ per cent, series B, bonds. The notes are authorized for sale at 98½ to Dillon Read & Co., making the annual cost to the railroad approximately 6.58 per cent.

PACIFIC & IDAHO NORTHERN.—*Divisions.*—George M. Curtis, examiner for the Interstate Commerce Commission, has recommended in a proposed report the dismissal of this company's complaint against the Oregon Short Line and other lines of the Union Pacific system asking for increased divisions on through traffic. He recommends a finding that the present divisions are not unjust, stating that they represent a constructive mileage approximately 5 miles for the P. & I. N. to 1 mile for the Union Pacific lines, which is characterized as "a very liberal basis." The company has been operating at a deficit in its net railway operating income since 1925 and its freight revenues since 1911 have fluctuated from $66,566 in 1915 to $157,271 in 1920. It asked for increased divisions which would give it $125,000 additional freight revenue annually and its witness estimated that the total freight revenue from traffic from the P. & I. N. earned by it and the Union Pacific system will approximate $450,000 a year, of which he believed that $200,000, or nearly 45 per cent, would be little enough for it to receive as its share.

ST. LOUIS SOUTHWESTERN.—*Securities.*—The Interstate Commerce Commission has authorized this company to issue $1,114,000 of first terminal and refunding mortgage bonds and to assume obligation and liability for $600,000 of Southern Illinois & Missouri Bridge Company first mortgage bonds, and $511,000 of Paragould Southeastern first and refunding mortgage bonds. These bonds are authorized to be pledged and repledged until July 1, 1932, as collateral security for short term notes.

Average Prices of Stocks and of Bonds

	Sept. 1	Last week	Last year
Average price of 20 representative railway stocks.	60.26	59.28	115.40
Average price of 20 representative railway bonds..	87.16	85.53	95.53

Dividends Declared

Alabama & Vicksburg.—Capital, 3 per cent, semi-annually, payable on October 1, to holders of record September 11.

Lehigh Valley.—Preferred, $1.25, quarterly, payable October 1 to holders of record September 12. Common dividend omitted.

St. Joseph, South Bend & Southern.—Common, 75c; preferred, 2½, both payable September 15, to holders of record September 10 to 15.

Vicksburg, Shreveport & Pacific.—Common and preferred, 2½ per cent, semi-annually, payable on October 1, to holders of record September 11.

Construction

ATCHISON, TOPEKA & SANTA FE.—This road contemplates the construction of a freight house at Ft. Worth, Tex., on the site of the existing freight facilities. The new station will measure 50 ft. by 410 ft. and will be of brick and concrete construction on concrete piers. It will have two stories and a basement, with provision for the addition of a third floor if need for it should develop. In addition to the boiler rooms, the basement will contain space for a blueprint room, file rooms and a vault, while the first floor will be used for the freight offices, a freight room and a cold storage room. The offices of the division superintendent and his organization will occupy the second floor. It is expected that contracts for this work will be let in the near future.

DELAWARE & HUDSON.—The New York Public Service Commission has approved as not excessive the low bid of the New England Construction Company, Springfield, Mass., for the elimination of the Elsmere-Bethlehem county highway crossing of this railroad's tracks in Bethlehem, N. Y.

ERIE.—An estimate of cost filed by this company for the elimination of the Kelly crossing, Erwin, N. Y., has been approved by the Public Service Commission of New York.

FORT WORTH (TEX.) UNION PASSENGER STATION COMPANY.—This company, which is controlled by the Atchison, Topeka & Santa Fe and the Southern Pacific, has adopted plans for a new passenger station at Ft. Worth, and it is expected that construction will commence in about 60 days. The new station, which will replace the existing station facilities, will be two stories high and will have dimensions of 91 ft. by 245 ft. The main waiting

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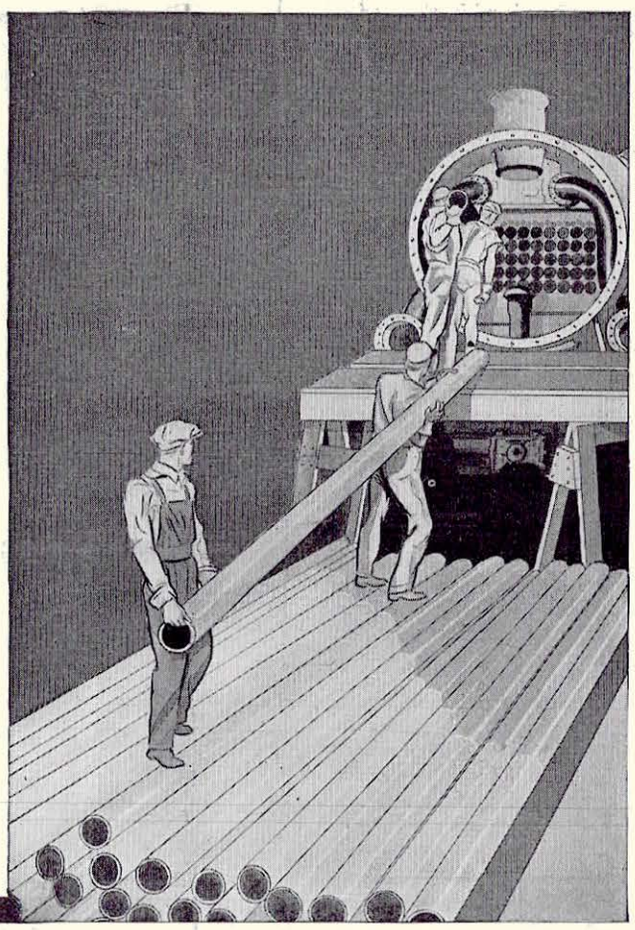

LONGER LIFE

from seamless TONCAN IRON TUBES

IRON BOILER TUBES have been standard on many roads due to their superior corrosion resistance and despite other draw-backs.

Now, in tubes of Toncan Iron the old disadvantages disappear, while corrosion-resistance is still further improved.

There are no seams in a Toncan Iron boiler tube. Moreover working and welding are easy and leave the corrosion-resisting properties of the metal unaffected. Toncan Iron is uniform in composition and free from the uncertainties of slag spots and seams.

Judged from any view-point, Toncan Iron is the ideal boiler tube. Performance records prove its economy.

REG. U.S. PAT. OFF.
TONCAN
COPPER
Mo-lyb-den-um
IRON

The Birdsboro Steel Foundry & Machine Company of Birdsboro, Penna., has manufactured and is prepared to supply under Toncan license, copper-molybdenum castings for the locomotive.

REPUBLIC STEEL
CORPORATION
General Office: Youngstown, Ohio

room will be connected with the trainsheds by a passenger subway with ramps to the track level, while there will be a separate subway for the handling of express and baggage. The trainsheds will be of the umbrella type. It is expected that the St. Louis Southwestern will continue as a tenant of the new station.

KANSAS CITY TERMINAL.—A contract has been awarded to the Kansas City Structural Steel Company, Kansas City, Kan., for the reconstruction of the Tenth Street viaduct in Kansas City over the tracks of this company, the Union Pacific and the Chicago, Rock Island & Pacific. The low bid was $57,625 and the cost will be borne by the three roads and the Kansas City Public Service Company.

LOUISVILLE & NASHVILLE.—The Southern Construction Company, Birmingham, Ala., has been awarded a contract for the construction of trainsheds adjoining the L. & N. passenger station at Birmingham, at a cost of $37,400. The trainsheds, which will be of the butterfly type, will be constructed of concrete and steel.

TERMINAL RAILROAD ASSOCIATION OF ST. LOUIS.—The St. Louis (Mo.) Board of Public Service has awarded a contract to the Ben Hur Erection Company for the erection of the steel for the East St. Louis Union Station approach to the St. Louis Municipal Bridge. The amount of the bid was $131,250, or $18.75 a ton.

UNION PACIFIC.—The Overland Terminal Warehouse Company, a subsidiary of the Union Pacific, contemplates the construction of a warehouse at Ninth and Alameda streets, Los Angeles, Cal., to cost about $500,000.

UNION RAILWAY.—A contract for the construction of a 2,300-ft. reinforced concrete viaduct to carry Summer avenue over the tracks of this company near Bingham street, Memphis, Tenn., has been awarded to the S. & W. Construction Company, Memphis. The cost of the project, which will amount to about $145,000, will be shared by the railway, the city and the state.

WESTERN PACIFIC.—A contract for the construction of a four-stall enginehouse, a machine shop and other engine-terminal facilities at Keddie, Cal., has been awarded to Ryberg-Sorensen, Inc., Salt Lake City, Utah. Keddie is the point at which this company's Northern California extension, which is now under construction, connects with the main line.

WINTER GARDEN BELT.—Examiner O. D. Weed of the Interstate Commerce Commission has recommended in a proposed report that the commission find that public convenience and necessity have not been found to require the construction of this company's proposed line from Asherton to Quemada, Tex., about 70 miles. He said that the applicant is not properly prepared to build the line, its resources being insufficient and its financial plan objectionable, and that it is apparent that the line, when necessary, should be built by the Southern Pacific.

Railway Officers

FINANCIAL, LEGAL AND ACCOUNTING

M. F. Harden, auditor of the Central of Georgia, has been appointed comptroller of that road, succeeding **W. B. McKinstry,** now comptroller of the Illinois Central. Mr. Harden has also been appointed to undertake Mr. McKinstry's former duties as auditor of the Wrightsville & Tennille, Wadley Southern, Louisville & Wadley and Sylvania Central, with headquarters as before at Savannah, Ga.

OPERATING

Leland H. Kent, chief engineer of the Pere Marquette car ferries, has been appointed superintendent, with headquarters at Ludington, Mich., to succeed **W. L. Mercereau,** who has retired.

George N. Ewing, assistant trainmaster of the New York division of the Reading, has been appointed assistant superintendent of that division, with headquarters at Philadelphia, Pa.

L. C. Redmond, supervisor of telegraph on the Missouri Pacific at Kansas City, Mo., has been promoted to general supervisor of telegraph, with headquarters at St. Louis, Mo., succeeding **C. E. Wynne,** who has retired.

W. C. Sloan, general manager of the Eastern district of the Northern Pacific, with headquarters at St. Paul, Minn., has had his jurisdiction extended to include the Western lines, following the death of **James E. Craver,** general manager of the Western lines, on August 15, as noted in the *Railway Age* for August 22. Mr. Sloan will have offices in both St. Paul and Seattle, Wash.

The divisional organization of the Missouri-Illinois, which heretofore has been maintained as a separate operating unit of the Missouri Pacific, has been abolished and the mileage of this line has been distributed between the Illinois and Missouri divisions of the Missouri Pacific. **C. C. Chapman,** superintendent of the Missouri and Illinois divisions, now has jurisdiction over the Missouri division and the Missouri-Illinois west of the Mississippi river, including the river transfer, with headquarters at Poplar Bluff, Mo. **R. C. Williams,** superintendent of the Memphis division, with headquarters at Wynne, Ark., has been transferred to Bush, Ill., with jurisdiction over the Illinois division and the Missouri-Illinois east of the Mississippi river, exclusive of the river transfer. **H. Schantl,** superintendent of the Missouri-Illinois at Bonne Terre, Mo., has been transferred to Wynne, to succeed Mr. Williams. The position of superintendent at Bonne Terre has been abolished.

TRAFFIC

Fred L. Taylor, agricultural agent of the Colorado & Southern, with headquarters at Denver, Colo., has been appointed general live stock agent for the Chicago, Burlington & Quincy, Lines West of the Missouri River, with headquarters at Omaha, Neb., to succeed **E. E. Grimes,** deceased.

C. Reyner-Smith has been appointed general agent for the United States and Canada of the Great Western of Great Britain with headquarters at New York. He succeeds **G. E. Orton,** who has represented the Great Western in that capacity for many years, and who recently returned to England.

S. A. Williams, who has been appointed freight traffic manager of the Alton, as noted in the *Railway Age* for August 29, has been with this road since 1914. He was born on August 2, 1884, at Savannah, Ga., and after a high school education, entered the service of the Queen & Crescent Route (now part of the Southern), in 1906, as a traveling freight agent, serving in the traffic department of that road at New Orleans, La., Birmingham, Ala., and Indianapolis, Ind. In 1914, he went with the Chicago & Alton (now the Alton), as commercial agent at Indianapolis, and two years later was made general agent at Peoria, Ill. In 1917, Mr. Williams was appointed general agent at St. Louis, Mo., representing the operating and traffic departments, and in 1924 he was appointed general freight agent at Chicago. He was holding the latter position at the time of his promotion to freight traffic manager, effective August 24.

S. A. Williams

ENGINEERING AND SIGNALING

H. A. Roberts has been appointed division engineer of the Oregon division, Oregon-Washington Railroad & Navigation Company, with headquarters at Portland, Ore. Mr. Roberts succeeds L. V. Chausse, transferred.

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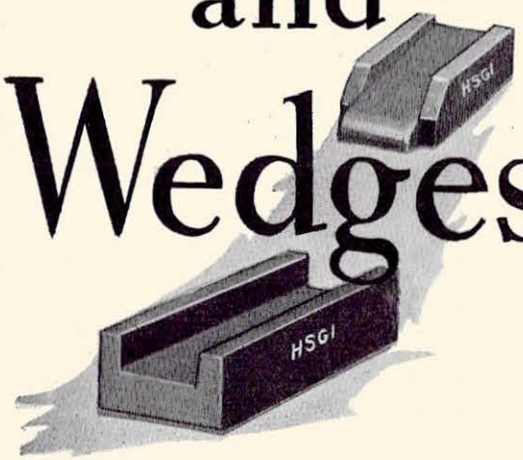
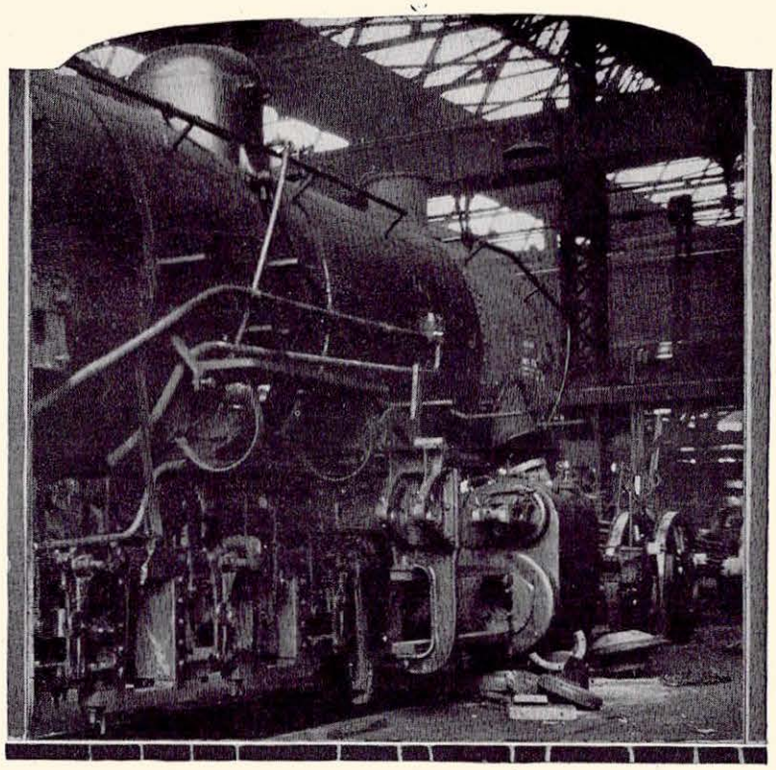
Shoes and Wedges





EVERY railroad executive interested in the cost of locomotive maintenance should be interested in the savings which can be effected by the use of HUNT-SPILLER *Air Furnace* GUN IRON shoes and wedges.

Their wear-resisting qualities insure a service life that extends over many shopping periods, eliminate the necessity of frequent wedge adjustments and increase the mileage of many running gear parts by preventing destructive driving box pounds.

Order sufficient HUNT-SPILLER *Air Furnace* GUN IRON shoes and wedges to equip a few locomotives—watch the reduction of your maintenance costs. The results will surprise you.

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J. G. Platt, Pres. & Gen. Mgr. V. W. Ellet, Vice-President

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Cylinder Bushings
Cylinder Packing Rings
Pistons or Piston Bull Rings
Valve Bushings
Valve Packing Rings
Valve Bull Rings
Crosshead Shoes
Hub Liners
Shoes and Wedges
Floating Rod Bushings

Parts Finished for Application

Dunbar Sectional Type Packing
Duplex Sectional Type Packing
(Duplex Springs for Above Sectional Packing)
Cylinder Snap Rings
Valve Rings All Shapes

HUNT-SPILLER GUN IRON

Air Furnace

A. H. McKeen, signal engineer of the Union Pacific System, with headquarters at Omaha, Neb., has been appointed signal engineer of the Oregon-Washington Railroad & Navigation Company, the Oregon Short Line and the Los Angeles & Salt Lake, with headquarters at Salt Lake City, Utah. The signal engineers of these three western units have been appointed signal supervisors of their respective lines. These include **R. C. Charlton** of the O.-W. R.R. & N. with headquarters at Portland, Ore., **J. S. Orr** of the O. S. L., with headquarters at Pocatello, Idaho, and **A. R. White** of the L. A. & S. L., with headquarters at Salt Lake City.

Following the consolidation of a number of divisions, as well as other changes, on the Louisville & Nashville, a number of roadmasters have been appointed to the newly created positions of division engineer. **W. S. Moore,** roadmaster on the Owensboro division, with headquarters at Owensboro, Ky., has been appointed division engineer of the combined Louisville, Cincinnati & Lexington and Louisville divisions, under the name of the Louisville division, with headquarters at Louisville, Ky. The greater part of the Owensboro division has been consolidated with the St. Louis & Henderson division under the name of the Evansville division, and **L. L. Adams,** roadmaster of the Louisville terminals, at Louisville, has been appointed division engineer of the new Evansville division and of the East St. Louis terminal, with headquarters at Evansville, Ind. **J. C. Nickerson,** roadmaster of the Cincinnati and Cincinnati Terminals divisions, has been appointed division engineer of these divisions, with headquarters as before at Latonia, Ky. Prior to September 1 the Cincinnati division was known as the Kentucky division. The following roadmasters have been appointed division engineers of their respective divisions, with headquarters at the same points: **A. F. Frendberg,** Eastern Kentucky division, at Ravenna, Ky.; **J. S. Hestle,** Nashville division and Nashville terminals, at Nashville, Tenn.; and **G. C. Wendling,** Memphis Line, Nashville. **R. N. Crapster,** roadmaster at Paris, Ky., has been appointed division engineer of the Birmingham division, with headquarters at Birmingham, Ala. **R. S. Goldthwaite,** roadmaster of the Mobile & Montgomery division, with headquarters at Montgomery, Ala., has been appointed division engineer of the combined Mobile & Montgomery and New Orleans & Mobile divisions, under the name of the Montgomery & New Orleans division.

MECHANICAL

Effective September 1, the position of superintendent car department of the Central of New Jersey was abolished, and **John Clark,** who served in that capacity, has been appointed general foreman freight car shop with headquarters at Ashley, Pa., succeeding **A. J. Ferentz,** who has been assigned to other duties.

E. F. Stroeh, master mechanic of the Missouri division of the Missouri Pacific, with headquarters at Poplar Bluff, Mo., has had his jurisdiction extended to include the Missouri-Illinois, a unit of the Missouri Pacific. The position of master mechanic of the Missouri-Illinois, which was held by **R. Kling,** with headquarters at Bonne Terre, Mo., has been abolished.

OBITUARY

G. Clinton Ferris, retired assistant superintendent of the Delaware, Lackawanna & Western, died at his home in Syracuse, N. Y., on August 19, after a long illness.

Edwin H. McHenry, formerly chief engineer of the Northern Pacific and the Canadian Pacific, and also vice-president of the New York, New Haven & Hartford, whose death was announced in the *Railway Age* of August 29, page 346, was born in Cincinnati, Ohio, on January 25, 1859. He studied at Pennsylvania Military College, where he received a degree in 1876 and an honorary degree 16 years later. He began his railroad career with the Northern Pacific as a rodman in 1883, and in 10 years advanced to the position of chief engineer. He was chief engineer of the Canadian Pacific from 1902 to 1904 and in 1904, he became vice-president of the New York, New Haven & Hartford. The electrification work on that road was carried out under his direction. He established the consulting engineering firm of McHenry & Murray in New Haven, Conn., in 1914, at which time he relinquished his railroad duties. He retired from active practice two years later.

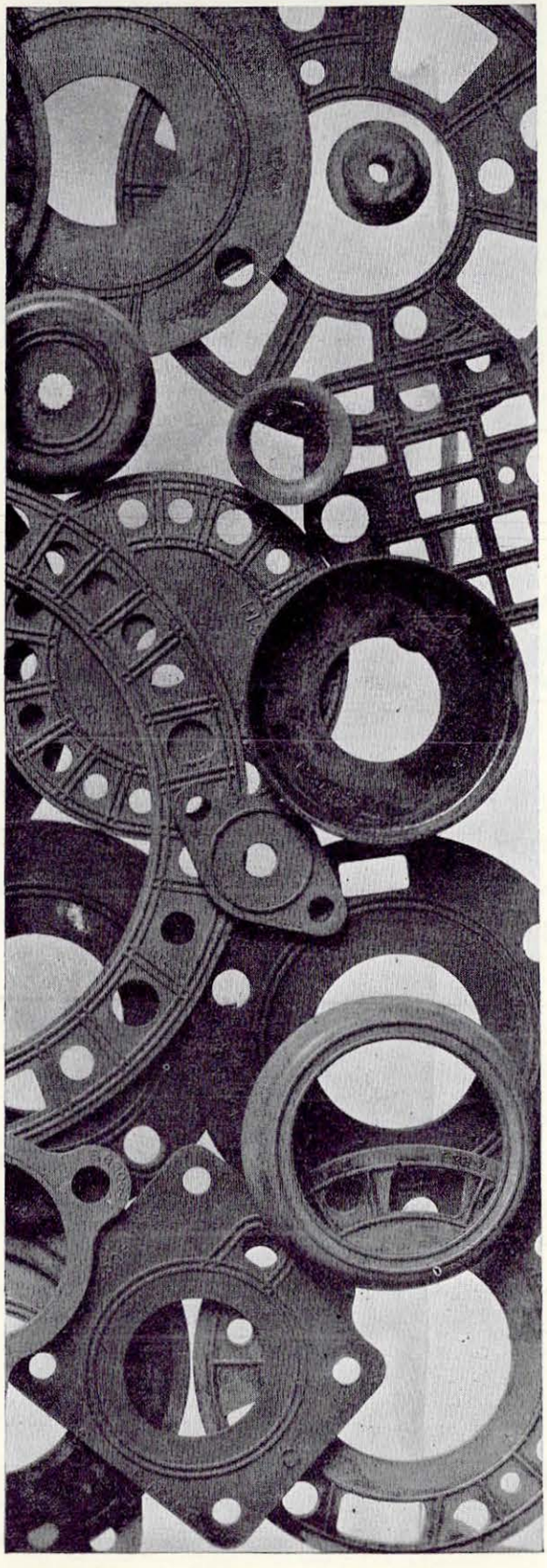
Bode Keefer Smith, passenger traffic manager of the Western Pacific, with headquarters at San Francisco, Cal., died in that city on August 24, after an illness of several months. Mr. Smith had been in railway service for 32 years. He was born on August 2, 1883, at San Francisco, and after a public school education entered the traffic department of the Denver & Rio Grande at the age of 15. During the next 14 years he served as city passenger agent and traveling passenger agent on this road and other Gould lines, including the Missouri Pacific. In September, 1913, he was appointed assistant general passenger agent of the Western Pacific and three years later he was made general passenger agent, with headquarters at San Francisco. In June, 1925, Mr. Smith was advanced to assistant traffic manager and in January, 1927, he was made assistant freight traffic manager. Six months later he was promoted to passenger traffic manager at San Francisco, which position he retained until his death.

Bode Keefer Smith

Frederick H. Hammill, who retired in 1926 as executive vice-president of the Chicago, Rock Island & Pacific, died on August 30, of heart failure, at his home in Chicago. Mr. Hammill was born on January 23, 1872, at Rockford, Ill., and served a total of 40 years with various roads. He entered the service of the Chicago & North Western as an operator in 1886 and later went with the Chicago, Milwaukee & St. Paul, where he served successively as an operator, file clerk, freight brakeman, assistant train dispatcher and chief train dispatcher. After more than 10 years with this road, Mr. Hammill returned to the North Western as chief train dispatcher on the Galena division. From 1902 to February, 1913, he was promoted successively through the position of trainmaster, assistant superintendent and superintendent, holding the latter position on the Sioux City, Northern Wisconsin, Iowa and West Iowa divisions. On the latter date, he was advanced to assistant general superintendent at Boone, Iowa, where he remained until October, 1917, when he was appointed general superintendent of the Northern district of the Union Pacific. Mr. Hammill returned to the North Western in March, 1920, as assistant general manager, being advanced to general manager in 1924. A year later, he was appointed executive vice-president of the Chicago, Rock Island & Pacific, with headquarters as before at Chicago, holding this position until his retirement in 1926. Since that date, Mr. Hammill had been a member of the National Railway Board of Wage Adjustment.

Frederick H. Hammill

WABCO



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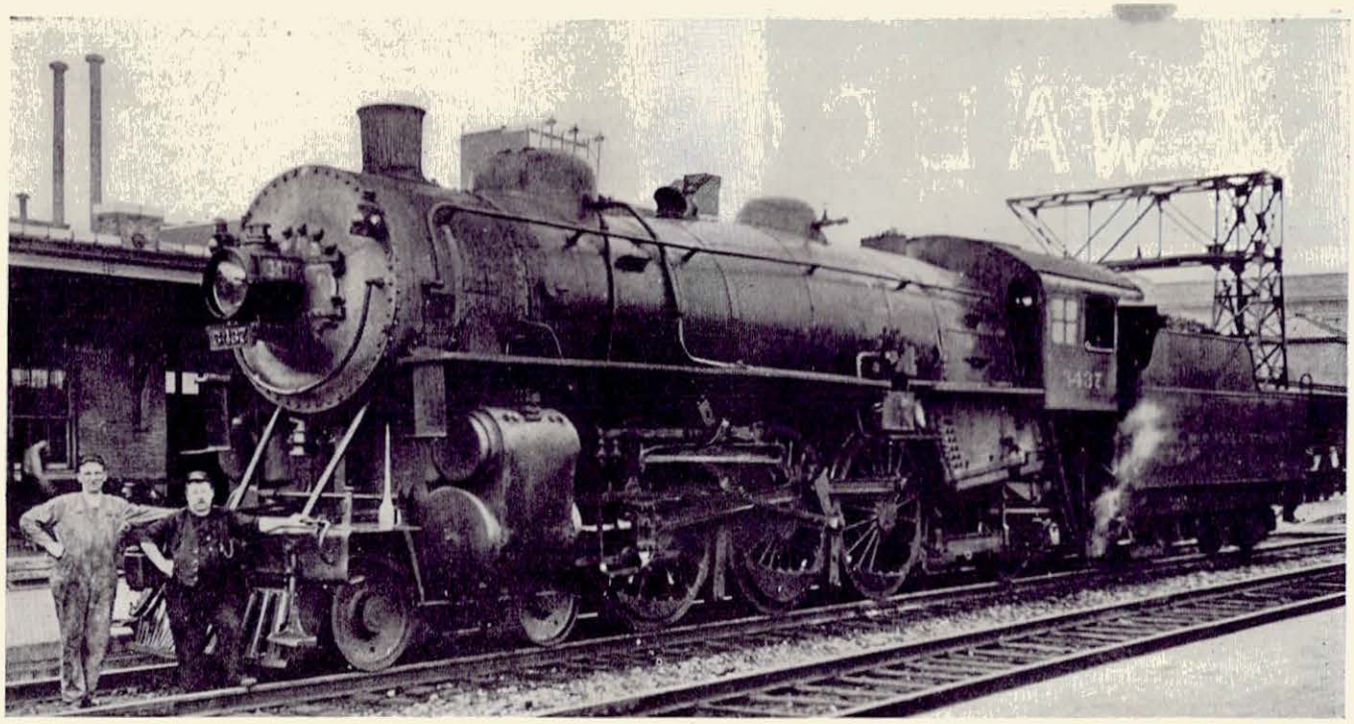

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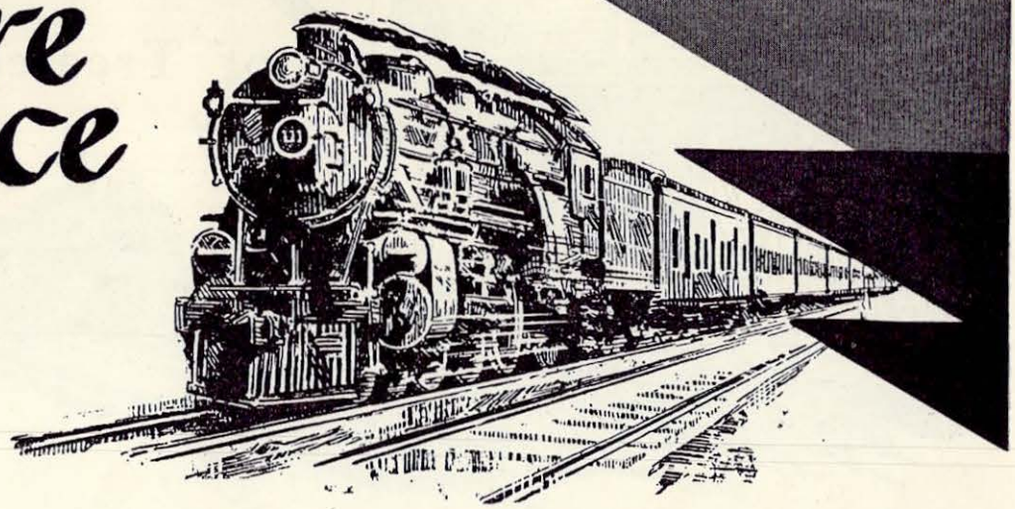

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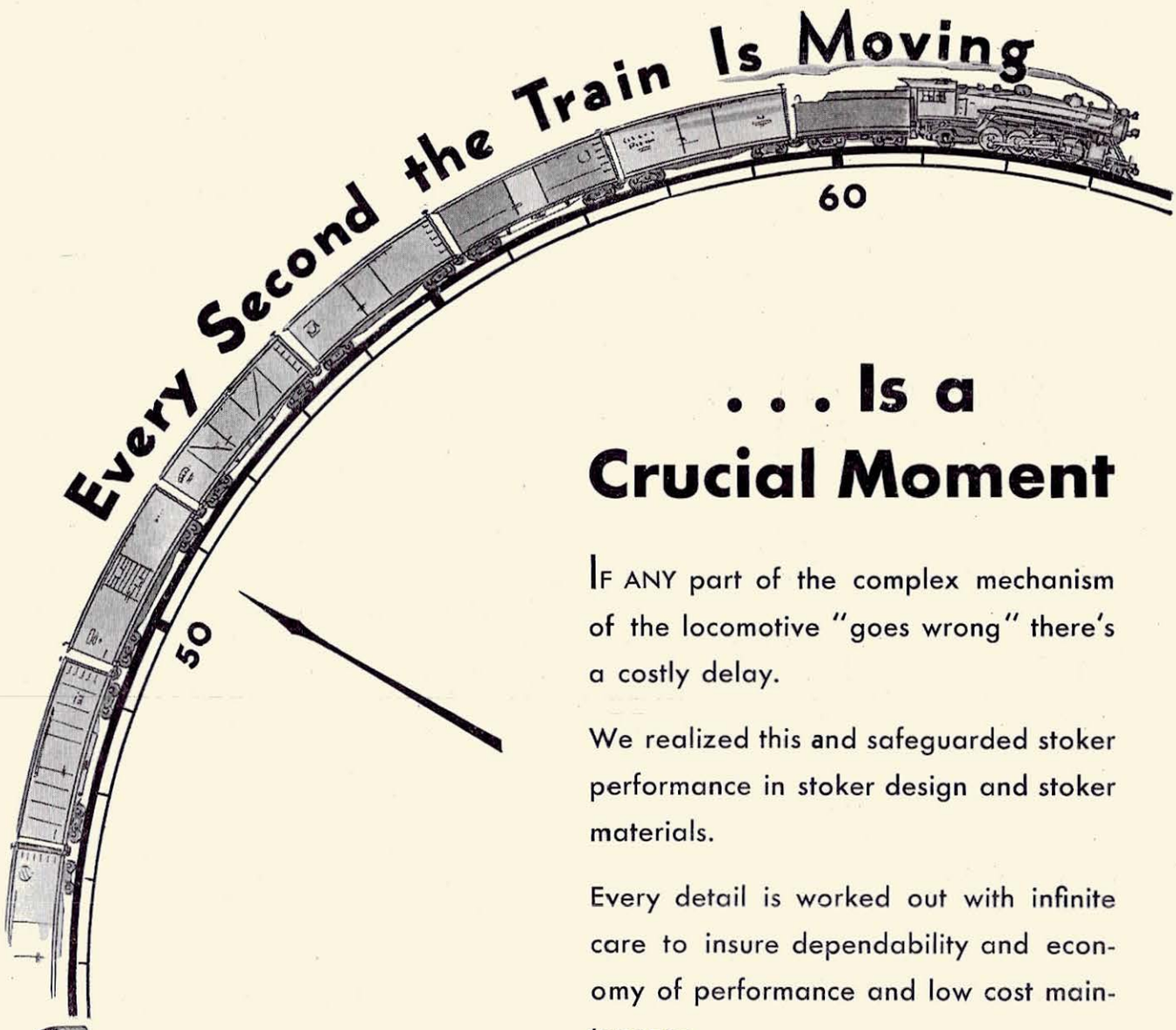

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Each new detail design is subjected to grueling laboratory and road tests before it is adopted as a standard part.

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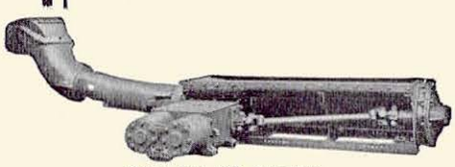
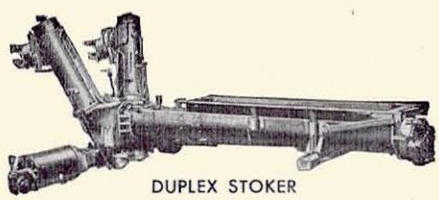

TYPE "B-K" STOKER

TYPE "B" STOKER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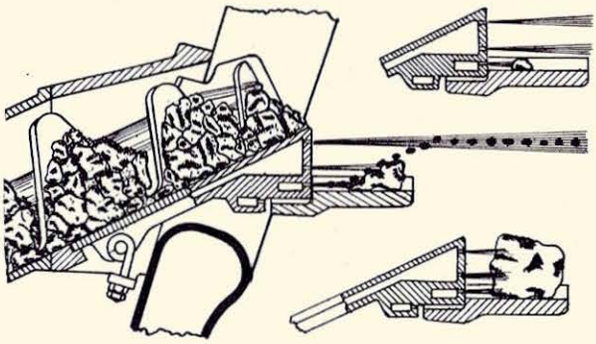

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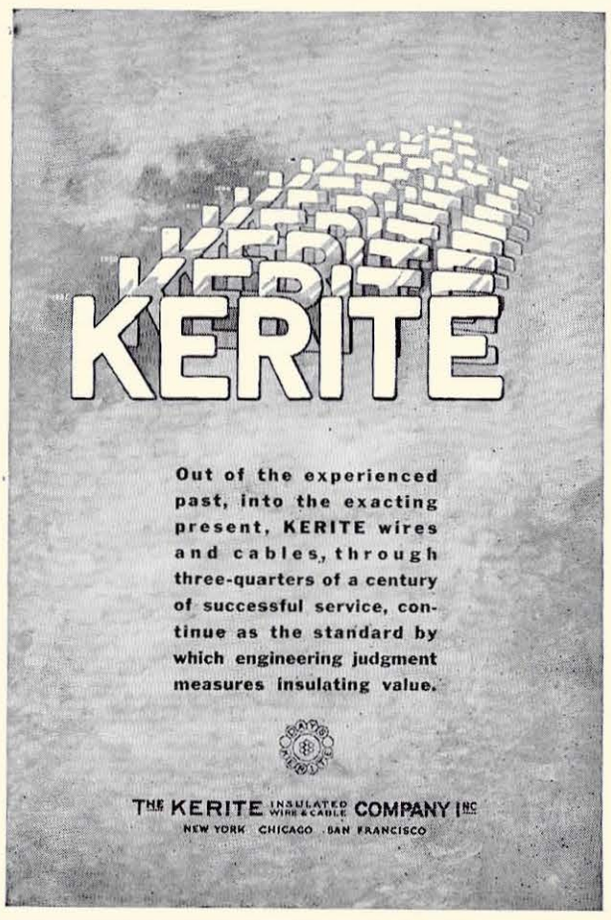
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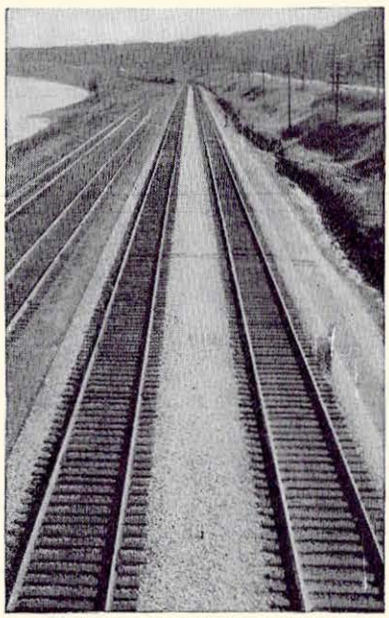

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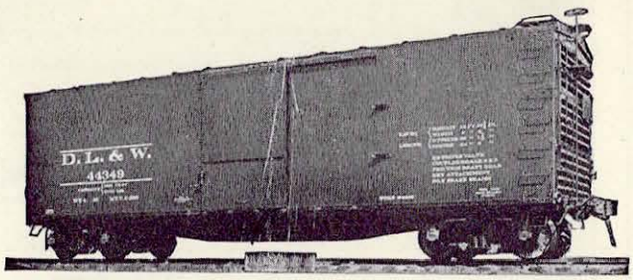

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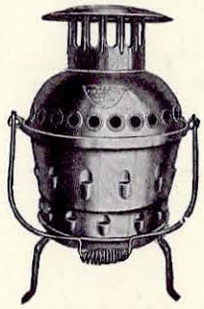

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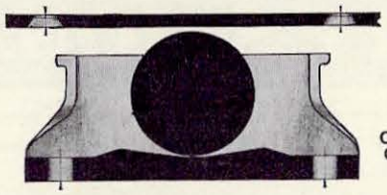

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For location of advertisements in this issue of manufacturers listed in the Buyers Index, see Advertisers Index on the last page next to cover

BUYERS INDEX

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Remington Rand Business Service.

Acetylene, Dissolved.
Oxweld Railroad Service Co., The.

Aftercoolers, Air.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Air Brakes.
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Air Lifts.
Ingersoll-Rand Co.
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Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Air Reservoir Joints—(See Joints, Air Reservoir).

Alloy Steel.
Bethlehem Steel Co.
Illinois Steel Co.
Republic Steel Corp.
Ryerson & Son, Inc., Jos. T.

Alloys, Strong Aluminum.
Aluminum Co. of America.

Angle Bars — (See Joints, Rail).

Angles, Channels and Tees—(See Shapes, Structural).

Anti-Creepers, Rail.
Bethlehem Steel Co.
P. & M. Company, The.

Arch, Locomotive Brick.
American Arch Co., Inc.

Arresters, Lightning.
General Electric Co.
General Railway Signal Co.
P. & M. Company.
Railroad Supply Co., The.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Ash Conveyors.
Industrial Brownhoist Corp.

Ash Handling Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Ash Pans, Cast Steel.
General Steel Castings Corp.

Auxiliary Locomotive.
Bethlehem Steel Co.

Axles, Car and Locomotive.
American Locomotive Co.
Baldwin Locomotive Works.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Lima Locomotive Works.
Midvale Co., The.
Standard Steel Works Co.

Axles, Mine Car.
Brill Co., The J. G.
Mt. Vernon Car Mfg. Co.

Axles, Motor Trucks.
Timken-Detroit Axle Co.

Babbitt Metal.
National Bearing Metals Corp.
Ryerson & Son, Inc., Jos. T.
Westinghouse Elec. & Mfg. Co.

Baggage Door Controller Device.
Edwards Co., O. M.

Barges, Steel.
American Bridge Co.

Barges, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Bars, Concrete, Reinforcing.
Carnegie Steel Co.
Central Alloy Steel Corp.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Bars, Iron and Steel.
Armco Railroad Sales Co.
Carnegie Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Illinois Steel Co.
Inland Steel Company.
Lockhart Iron & Steel Co.
McConway & Torley Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Bars, Rolled Steel.
Carnegie Steel Co.

Batteries, Lighting.
Electric Storage Battery Co.

Batteries, Starting.
Electric Storage Battery Co.

Batteries, Storage.
Electric Storage Battery Co.
Railroad Supply Co.
Safety Car Heating & Lighting Co.

Batteries, Wet Cell.
Electric Storage Battery Co.

Beams, Channel & Angle.
Carnegie Steel Co.
Illinois Steel Co.
Ryerson & Son, Inc., Joseph T.

Bearings, Axle Generator.
S. K. F. Industries, Inc.
Westinghouse Elec. & Mfg. Co.

Bearings, Ball Thrust.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The.

Bearings, Center.
Brill Co., The J. G.
Chicago Railway Equipment Co.
Miner, W. H.
Pressed Steel Car Co.
Symington Co., The.

Bearings, Journal.
Fafnir Bearing Co.
Magnus Co., Inc.
National Bearing Metals Corp.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The.

Bearings, Journal Roller.
Fafnir Bearing Co.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The.

Bearings, Roller.
American Steel Foundries Co.
Fafnir Bearing Co.
Hyatt Roller Bearing Co.
Miner, W. H.
Shafer Bearing Corp.
S. K. F. Industries, Inc.
Standard Car Truck Co.
Stucki Co., A.
Timken Roller Bearing Co.
Wine Railway Appliance Co.

Bearings, Roller Side.
Q. & C. Company, The.
Standard Coupler Co.
Stucki Co., A.

Bearings, Side.
American Steel Foundries.
Chicago Railway Equipment Co.
Fort Pitt Malleable Iron Co.
Standard Car Truck Co.
Stucki Co., A.
Wine Railway Appliance Co.

Beds, Cast Steel, Locomotive.
General Steel Castings Corp.

Bell Ringer, Locomotive.
Ardco Mfg. Co.
Prime Mfg. Co., The.

Bells, Highway Crossing.
Railroad Supply Co.

Belt Lacing Machines.
Birdsboro Steel Foundry & Mach. Co.

Benders, Rail.
Q & C Co., The

Bending and Straightening Machines.
Ryerson & Son, Jos. T.
Sellers & Co. Inc., Wm.

Billets, Steel.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
McConway & Torley Co.
Midvale Co., The.
Ryerson & Son, Jos. T.
Republic Steel Corp.
Standard Steel Works Co.

Blocks, Chain.
Barco Mfg. Co.

Blocks, Creosoted.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
International Creosoting & Constr. Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Blooms, Steel.
Carnegie Steel Co.
Republic Steel Corp.

Blower Fittings, Automatic Smokebox.
Barco Mfg. Co.

Blowers, Turbo.
Ingersoll-Rand Co.

Blowtorches, Acetylene.
Oxweld Railroad Service Co., The.

Boiler (all types).
Baldwin Locomotive Works, The.

Boiler Checks.
Prime Manufacturing Co., The.

Boilers, Locomotive.
American Locomotive Co.
Baldwin Locomotive Works
Lima Locomotive Works.

Boilers, Scale Proof.
Industrial Brownhoist Corp.

Bolsters, Steel.
American Steel Foundries.
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Bradford Corporation.
Brill Co., The J. G.
Buckeye Steel Castings Co.
Gould Coupler Co., The.
Mt. Vernon Car Mfg. Co.
Ohio Steel Foundry Co., The
Pressed Steel Car Co.
Symington & Son, Inc., T. H.

Bolts and Nuts.
Baldwin Locomotive Works, The
Bethlehem Steel Co.
Buffalo Brake Beam Co.
Dardelet Threadlock Corp.
Neely Nut & Bolt Co.
Russell, Burdsall & Ward Bolt and Nut Co.
Ryerson & Son, Joseph T.
Westinghouse Elec. & Mfg. Co.

Bolts & Nuts, Monel Metal.
International Nickel Co., The.

Bolts, Patch.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Bolts, Track.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Bonders, Rail.
Q & C Co., The.

Bonding Rail Outfits.
Ingersoll-Rand Co.

Bonds, Rail.
American Steel & Wire Co.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Bonds, Signal.
American Steel & Wire Co.
Railroad Supply Co.

Bond, Wire Protection.
P & M Co., The.

Boosters, Locomotives.
Franklin Railway Supply Co., Inc.

Boring & Drilling Machines, Horizontal.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.

Boring Machines, Car Wheel
Sellers & Co., Inc., Wm.

Boring & Turning Mills, Horizontal.
Sellers & Co., Inc., Wm.

Boring & Turning Mills, Vertical.
Sellers & Co., Inc., Wm.

Braces, Rail
Bettendorf Co., The.
Fort Pitt Malleable Iron Co.
National Malleable & Steel Castings Co.
Q & C Co., The.
Ramapo Ajax Co.
Symington Co., The.

Brake Beam Safety Guards.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.

Brake Beam Supports.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.

Brake Beams.
American Steel Foundries.
Bradford Corporation.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
Hunt-Spiller Mfg. Corp.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Pressed Steel Car. Co.

Brake Drums.
American Car & Foundry Motors Co.
Hunt-Spiller Mfg. Corp.

Brake Forgings, Pins, Levers, etc.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Davis Brake Beam Co.
Mt. Vernon Car Mfg. Co.
Schaefer Equipment Co.

Brakes, Hand.
National Brake Co.

Brake Heads.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
Pressed Steel Car Co.

Brake Jaws.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Schaefer Equipment Co.

Brake Shoes.
American Brake Shoe & Foundry Co.
American Steel Foundries.
Brill Co., The J. G.
Buckeye Steel Castings Co.
Fort Pitt Malleable Iron Co.
Mt. Vernon Car Mfg. Co.
Wheel Truing Brake Shoe Co.

Brake Shoes, Wheel Truing.
Wheel Truing Brake Shoe Co.

Brakes, Air.
General Electric Co.
New York Air Brake Co.
Westinghouse Air Brake Co.

Brakes, Clasp.
American Steel Foundries.

Brakes, Electric.
New York Air Brake Co.
Westinghouse Air Brake Co.

Brakes, Hand.
Miner, W. H.
National Brake Co.
National Malleable & Steel Castings Co.
Wine Railway Appliance Co.

Brass, Sash.
Edwards Co., O. M.

Brick, Locomotive Arch.
American Arch Co., Inc.

Bridge Builders.
American Bridge Co.
Bethlehem Steel Co.

Bridge & Crossing Planks, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Bridge Flooring.
Carey Co., The, Philip.

Bridge Material, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Bridge Stringers — (See Stringers, Bridge).

Bronze Powder, Aluminum.
Aluminum Co. of America.

Bucket Handling.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Buckets, Grab.
American Bridge Co.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Buffers, Friction.
Edgewater Steel Co.
Miner, W. H.
Standard Coupler Co.
Westinghouse Air Brake Co.

Buffers, Radial.
Franklin Railway Supply Co., Inc.

Building Materials.
Carey & Co., Philip, The.
Johns-Manville Corp.

Buildings, Iron, Steel and Steel Concrete.
American Bridge Co.
United Engineers & Constructors, Inc.

Bulldozers.
Ryerson & Son, Joseph T.

Buses, Motor.
Reo Motor Car Co.

Bushings, Driving & Engine Truck Boxes.
Locomotive Finished Material Co.

Cable Accessories, Electrical.
Graybar Electric Co.

Cables, Electric.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Co.
Graybar Electric Co.
Kerite Insulated Wire & Cable Co.

Cableways—(See Tramways).

Caps, Grease.
Prime Mfg. Co., The.

Carbide, Calcium.
Oxweld Railroad Service Co.

Car Insulation.
Carey & Co., Philip The.
Wood Conversion Co.

Car Lighting Equipment—(See Lighting, Car Equipment).

Carlines.
Hutchins Car Rfg. Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Car Material, Wood.
Central Coal & Coke Co.

Car Parts and Appliances.
Pressed Steel Car Co.
Pullman Car & Mfg. Corp.

Car Parts, Freight.
Bettendorf Co., The.
General American Tank Car Corporation.
Pressed Steel Car Co.

Car Parts, Passenger.
Brill Co., The J. G.
St. Louis Car Co.

Car Repairs.
General American Tank Car Corporation.
Pressed Steel Car Co.
St. Louis Car Co.
Tennessee Coal, Iron & Railroad Co.

Car Retarder Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Car Siding — (See Siding, Car, etc.).

Cars, Baggage.
Brill Co., The J. G.
Pressed Steel Car Co.
St. Louis Car Co.

Cars, Ballast.
Bethlehem Steel Co.
General American Tank Car Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Caboose, Coal & Stock.
Mt. Vernon Car Mfg. Co.

Cars, Convertible.
Mt. Vernon Car Mfg. Co.

Cars, Dump.
Bethlehem Steel Co.
Bettendorf Co., The.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Flat, Narrow Gauge.
Bettendorf Co., The.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Freight.
Bethlehem Steel Co.
Bettendorf Co., The.
General American Tank Car Corp.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Pullman Car & Mfg. Co.

Cars, Freight (New and Repaired).
Bethlehem Steel Co.
Bettendorf Co., The.
General American Tank Car Corp.
Pressed Steel Car Co.

Cars, Gasoline-Electric.
Brill Co., The J. G.
Electro-Motive Co.
St. Louis Car Co.

Cars, Gasoline Motor.
Brill Co., The J. G.

Cars, Hand & Push.
Fairbanks-Morse & Co.

Cars, Industrial.
Bethlehem Steel Co.
Brill Co., The J. G.
General American Tank Car Corp.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Motor.
Fairbanks-Morse & Co.

Cars, Motor Inspection.
Fairbanks-Morse & Co.

Cars, Oil Electric.
Westinghouse Elec. & Mfg. Co.

Cars, Ore.
Brill Co., The J. G.
General American Tank Car Corp.
Pressed Steel Car Co.

Cars, Passenger.
Bethlehem Steel Co.
Brill Co., The J. G.
Electro-Motive Co.
Pressed Steel Car Co.
Pullman Car & Mfg. Corp.

Cars, Power Units.
Brill Co., The J. G.
Electro-Motive Co.

Cars, Quarry.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Rebuilt and Repaired.
Bettendorf Co., The.
General American Tank Car Corp.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Refrigerator.
General American Tank Car Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Cars, Second-Hand.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Self-Propelled Passenger.
Brill Co., The J. G.
Electro-Motive Co.
General Electric Co.
Pullman Car & Mfg. Corp.
Westinghouse Elec. & Mfg. Co.

Cars, Spreader.
Western Wheeled Scraper Co.

Cars, Tank.
Bethlehem Steel Co.
General American Tank Car Corp.
Indian Refining Co.
Pressed Steel Car Co.

Cars, Dump.
Western Wheeled Scraper Co.

Castings, Alloy Steel.
Symington Co., The.
Union Spring & Mfg. Co.

Castings, Brass and Bronze.
Baldwin Locomotive Works, The.
General Railway Signal Co.
Magnus Co., Inc.
National Bearing Metals Corp.
Union Switch & Signal Co.

Castings, Gray Iron.
American Brake Shoe & Foundry Co.
American Locomotive Co.
Baldwin Locomotive Works.
General Railway Signal Co.
Locomotive Finished Material Co.
Mt. Vernon Car Mfg. Co.
Ramapo Ajax Corp.
Union Switch & Signal Co.

Castings, Gun Iron.
Hunt-Spiller Mfg. Corp.

Castings, Iron & Steel.
Baldwin Locomotive Works, The.
Industrial Brownhoist Corp.

Castings, Malleable Iron.
Buckeye Steel Castings Co.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
Fort Pitt Malleable Iron Co.
National Malleable & Steel Castings Co.
P & M Company, The.
Pressed Steel Car Co.
Symington Co., The.
Universal Draft Gear Attachment Co.

Castings, Monel Metal.
International Nickel Co., The.

Castings, Steel.
Allegheny Steel Co.
American Locomotive Co.
American Steel Foundries.
Bethlehem Steel Co.
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Buckeye Steel Castings Co.
General Steel Castings Corp.
Gould Coupler Co., The.
McConway & Torley Co.
Midvale Co., The.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Steel Casting Co.
Universal Draft Gear Attachment Co.

Castings, Steel Loco.
Birdsboro Steel Foundry & Machine Co.
General Steel Castings Corp.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Castings, Steel Vanadium.
Birdsboro Steel Foundry & Machine Co.
Brill Co., The J. G.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Catchbasins, Iron.
Armco Culvert Mfrs. Assoc.

Cellers, Engine Truck.
Ardco Mfg. Co.

Cement Car, Asphalt.
Lehon Co., The.
Sherwin-Williams Co.

Cement, High Temperature.
Carey Co., Philip, The.
Johns-Manville Corp.

Cements, Asbestos and Magnesia.
Carey Co., Philip, The.

Center Plates—(See Bearings, Center).

Center Sills.
Bettendorf Co., The.
Bradford Corporation.

Chain, Monel Metal.
International Nickel Co., The.

Chemicals.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.

Chemicals, Boiler.
Bird-Archer Co., The.
Dearborn Chemical Co.

Chemicals, Cleaning.
Oakite Products, Inc.

Chemists.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Chromium Plating.
Worthington Pump & Machinery Corp.

Chucks, Lathe.
Ryerson & Son, Jos. T.

Cinder Handling Plants.
Roberts & Schaefer Co.

Circuit Breakers.
General Electric Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Clamps, Forging.
Ryerson & Son, Jos. T.

Clamps, Guard Rail.
O. & C. Co., The.
Westinghouse Air Brake Co.

Clamps, Hose.
Ingersoll-Rand Co.
National Malleable & Steel Castings Co.
Vapor Car Heating & Lighting Co.
Westinghouse Air Brake Co.

Clamps, Pipe.
Franklin Railway Supply Co., Inc.
National Malleable & Steel Castings Co.

Clamps, Rail Cutting.
Oxweld Railroad Service Co., The.

Classification Yard Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Cleaners, Aircraft.
Oakite Products, Inc.

Cleaners, Air Pump.
Oakite Products, Inc.
Westinghouse Air Brake Co.

Cleaners, Bus & Truck.
Oakite Products, Inc.

Cleaners, Car.
Oakite Products, Inc.

Cleaners, Flue.
Ryerson & Son, Jos. T.

Cleaners, General.
Oakite Products, Inc.

Cleaners, Locomotive.
Oakite Products, Inc.

Cleaners, Metal.
Oakite Products, Inc.

Clips, Wire Rope.
American Steel & Wire Co.

Coach and Coach Yard Steam Joints—(See Joints, etc.)

Coaches, Motor.
American Car & Foundry Motors Co.
Dodge Motor Truck Corp.
International Harvester Co.
White Co., The.

Coaches, SecondHand.
Hyman-Michaels Co.

Coal, Ore & Ash Handling Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.
Roberts & Schaefer Co.

Coal Pushers.
Standard Stoker Co.

Coaling Stations.
American Bridge Co.
FairbanksMorse & Co.
Roberts & Schaefer Co.

Cocks, Angle.
Westinghouse Air Brake Co.

Cocks, Blow-Off.
Bird-Archer Co., The.

Cocks, Cylinder.
Prime Manufacturing Co., The.

Columns, Water.
Prime Manufacturing Co., The.

Combination Crane Pile Drivers.
Industrial Brownhoist Corp.

Compounds, Boiler.
Dearborn Chemical Co.
Bird-Archer Co., The.

Compounds, Cleaning.
Oakite Products, Inc.

Compounds, Cutting.
Oakite Products, Inc.

Compounds, Grinding.
Oakite Products, Inc.

Compounds, Paint Removing.
Oakite Products, Inc.

Compounds, Rust Proofing.
Oakite Products, Inc.

Compressors, Air.
Ingersoll-Rand Co.
New York Air Brake Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Concrete Floor Slabs.
Federal American Cement Tile Co.

Concrete Reinforcement.
American Steel & Wire Co.
Carnegie Steel Co.
Ryerson & Son, Jos. T.

Concrete Roofing, Tile.
Federal American Cement Tile Co.

Condensers.
Ingersoll-Rand Co.

Condensing Apparatus.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Conduit, Rigid.
Aluminum Co. of America.

Conduits, Metallic Flexible.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Graybar Electric Co.
Vapor Car Heating Co., Inc.

Conduit, Underground.
Graybar Electric Co.
Johns-Manville Corp.

Connections, Lever.
National Malleable & Steel Castings Co.

Connections, Truck.
National Malleable & Steel Castings Co.

Connections, Truck Lever.
Schaefer Equipment Co.

Contraction Joint.
General Railway Signal Co.

Control Devices, Train Speed.
Union Switch & Signal Co.

Control, Locomotive.
Valve Pilot Co.

Controllers, Electric.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Conveying Machinery.
American Bridge Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Corrugated Sheet.
Aluminum Co. of America.

Conveyor, Ash—(See Coal, Ore and Ash Handling Mach.).

Coupler Pockets—(See Draft Yokes).

Coupler Yokes.
Bettendorf Co., The.
Gould Coupler Co.
Symington Co., The.

Couplers.
American Steel Foundries.
Buckeye Steel Castings Co.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
McConway & Torley Co.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Westinghouse Air Brake Co.

Couplings, Hose.
Fort Pitt Malleable Iron Co.
Gold Car Heating & Lighting Co.
Ingersoll-Rand Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Cranes, Ballast Cleaning.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Barge.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Bracket.
Shephard-Niles Crane & Hoist Corp.

Cranes, Crawler.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Crawling Shovels and Draglines.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Diesel.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Electric Traveling.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Gantry.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.
Shephard-Niles Crane & Hoist Corp.

Cranes, Gasoline.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Grab Bucket.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Handpower.
Industrial Brownhoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Jib.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Worthington Pump & Machinery Corp.

Cranes, Locomotive.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.

Cranes, Overhead.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Pillar.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Portable.
Orton Crane & Shovel Co.

Cranes, Transfer.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Traveling.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Wharf.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Wrecking.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Crank Pins — (See Pins, Crank).

Creosote.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
International Creosoting & Constr. Co.
National Lumber & Creosoting Co.

Creosote, Wood Preservative Treatment.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Cribbing Units.
Federal American Cement Tile Co.

Cross Arms, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Steel.
Bethlehem Steel Co.

Crossheads & Shoes.
Baldwin Locomotive Wks.
Barco Mfg. Co.
International Creosoting & Construction Co.

Crossing Signals & Signs.
Railroad Supply Co.

Crossings—(See Frogs and Crossings).

Crossings, Pavement.
Carey Co., The Philip.

Crushers, Coal.
American Sheet & Tin Plate Co.
Orton Crane & Shovel Co.

Culverts.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.
Toncan Culvert Manufacturers' Association.

Culverts, Corrugated Iron
Armco Culvert Manufacturers' Association.
Republic Steel Corp.

Culverts, Part Circle
Armco Culvert Manufacturers Association

Culverts, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cups, Oil.
Hammett, H. G.
New York Air Brake Co.
Prime Manufacturing Co., The.
Westinghouse Air Brake Co.

Curtain Material, Car.
Ryerson & Son, Jos. T.

Curtains, Cab.
Lehon Co., The.

Cutting and Welding Apparatus.
Electric Railweld Service Corp.
Oxweld Railroad Service Co.
Westinghouse Electric & Mfg. Co.

Cut-Off Indicators and Recorders.

Cylinder Parts, Finished and Rough.
Locomotive Finished Material Co.
National Tube Co.
Valve Pilot Co.

Cylinders, Air Brake.
Westinghouse Air Brake Co.

Cylinders, Cast Steel Locomotive.
General Steel Castings Corp.
Locomotive Finished Material Co.
Union Steel Casting Co.

Cylinders, Locomotive.
Locomotive Finished Material Co.

Deoxidizers.
Q & C Co., The.
Vanadium Corp. of America.

Derricks.
Industrial Brownhoist Corp.

Diesel Electric Power Plants.
Fairbanks-Morse & Co.
Westinghouse Elec. & Mfg. Co.

Dirt Collectors.
New York Air Brake Co.
Westinghouse Air Brake Co.

Disinfectants.
West Disinfecting Co.

Dispatching Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Ditching Machinery.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Door Fixtures — (See Fixtures, Car Door).

Doors, Car.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
Wine Railway Appliance Co.

Doors, Locomotive Firebox.
Franklin Railway Supply Co., Inc.

Doors, Rolling, Steel.
Kinnear Mfg. Co.

Draft Arms.
American Steel Foundries.
Birdsboro Steel Foundry & Machine Co.
Bradford Corporation.
Symington Co., The.
Universal Draft Gear Attachment Co.

Draft Gear Attachments.
Symington Co., The

Draft Gears.
American Steel Foundries.
Bradford Corporation.
Cardwell-Westinghouse Co.
Edgewater Steel Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Union Draft Gear Co.
Universal Draft Gear Attachment Co.

Draft Yokes.
American Steel Foundries.
Bettendorf Co., The.
Buckeye Steel Castings Co.
Gould Coupler Co., The.
McConway & Torley Co.
Miner, W. H.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Steel Car Forge Co.
Symington Co., The.
Universal Draft Gear Attachment Co.

Drainage Gates, Automatic
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Drains, Perforated Iron.
Republic Steel Corp.

Drawbar Centering Device.
Gould Coupler Co., The.
Miner, W. H.

Drawbars, Unit Safety.
Franklin Railway Supply Co., Inc.
Industrial Brownhoist Corp.

Dredging Machinery.
Industrial Brownhoist Corp.

Drilling Machines.
Sellers & Co., Inc., Wm.

Drilling Machines, Bonding.
Railroad Supply Co.

Drilling Machines, Pneumatic
Ingersoll-Rand Co.

Drilling Machines, Rock.
General Electric Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drilling Machines, Upright and Radial.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.

Drills.
Ingersoll-Rand Co.

Drills, Close Corner.
Ingersoll-Rand Co.

Drills, Concrete.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Steel Rock and Steel Sharpened.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Track & Bending.
Bird-Archer Co., The.
Ingersoll-Rand Co.

Drive Gas Electric Coaches.
General Electric Co.

Drive Gas Electric Locomotives
Westinghouse Electric & Mfg. Co.

Driving Boxes (Extended Main).
Franklin Railway Supply Co., Inc.

Drop Door Mechanism.
Wine Railway Appliance Co.

Dynamos—(See Generators, Electric).

Electrical Cable Accessories.
General Electric Supply Corp.

Electric Cables.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Electrical Instruments.
Electric Service Supplies Co.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Electrical Supplies.
General Electric Co.
General Electric Supply Corp.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Electrification, Railroad.
Battey & Kipp.
General Electric Co.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Electric Heaters.
General Electric Supply Corp.

Electrical Insulation.
General Cable Corp.
General Electric Supply Corp.

Electrical Porcelain Insulators.
General Electric Supply Corp.

Electric Motors.
General Electric Supply Corp.

Electric Rivet Heaters.
General Electric Supply Corp.

Electric Switches.
General Electric Supply Corp.

Enamels.
Lowe Bros. Co., The.
Sherwin-Williams Co.

End Frames, Cast Steel, Passenger Car.
General Steel Castings Corp.

Ends, Steel.
Hutchins Car Rfg. Co.
Union Metal Products Co.

Engineers, Consulting, Civil, Elec., Hydraulic. Mechanical.
Battey & Kipp.
Hunt Co., Robt. W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Contracting.
Battey & Kipp.
United Engineers & Constructors, Inc.

Engineers and Contractors.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Construction.
Battey & Kipp.
Roberts & Schaefer Co.
United Engineers & Constructors, Inc.

Engineers and Contractors, Elec., Hydraulic, Mech.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
Roberts & Schaefer Co.

Engineers, Inspecting.
Gulick-Henderson Co.
Hunt Co., Robert W.
Muhlfeld, John E.
Pittsburgh Testing Laboratory.
United Engineers & Constructors, Inc.

Engineers, Valuation.
Hunt Co., Robert W.
United Engineers & Constructors, Inc.

Engines, Crude & Fuel Oil.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Diesel.
Worthington Pump & Machinery Corp.

Engines, Gas.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Engines, Gas & Gasoline.
American Car & Foundry Motors Co.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Hoisting.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Excavators.
Industrial Brownhoist Corp.

Exhaust & Heater Pipe.
Union Asbestos & Rubber Co.

Exhaust & Ventilating Fans.
General Electric Supply Corp.

Expanders, Tube.
Ryerson & Son, Joseph T.

Fans, Exhaust & Ventilating.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Fasteners, Car Door.
Camel Sales Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Feed Water Heater Systems.
Bird-Archer Co., The.
Coffin, Jr., Co., The J. S.
Worthington Pump & Machinery Corp.

Fencing Wire—(See Wire, Fence).

Fence Posts, Treated.
American Steel & Wire Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Ferro Alloys.
Vanadium Corp. of America.

Ferro, Chromium.
Vanadium Corp. of America.

Ferro, Molybdenum.
Vanadium Corp. of America.

Ferro, Silicon.
Vanadium Corp. of America.

Ferro, Tungsten.
Vanadium Corp. of America.

Ferro, Vanadium.
Vanadium Corp. of America.

Filters, Air.
New York Air Brake Co.
Westinghouse Air Brake Co.

Filters, Water & Industrial.
Graver Tank & Mfg. Corp.

Filtration Plants (Water).
Graver Tank & Mfg. Corp.

Fireboxes.
American Locomotive Co.
Baldwin Locomotive Works.

Fire Fighting & Protection Equipment.
Johns-Manville Corp.

Fittings, Air Brakes.
Westinghouse Air Brake Co.

Fittings, Steam.
Vapor Car Heating Co., Inc.

Fixtures, Car Door.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Flangers, Snow.
Q & C Co., The.

Floodlights.
General Electric Supply Corp.
Graybar Electric Co.
Oxweld Railroad Service Co.
Pyle-National Co.
Symington Co., The.
Westinghouse Elec. & Mfg. Co.

Floodlights, Acetylene.
Oxweld Railroad Service Co., The.

Flooring.
Carey & Co., Philip, The.
Johns-Manville Corp.

Flooring, Car.
Tuco Products Corp.

Flooring, Coach.
Tuco Products Corp.

Flooring, Composition.
Johns-Manville Corp.
Tuco Products Corp.

Flooring, Treated.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Floor Plates, Steel.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Company

Floor Slabs, Concrete.
American Cement Tile Mfg. Co.

Flue Cleaners—(See Cleaners, Flue).

Flue Cutters—(See Cutters, Flue).

Flues, Boiler—(See Tubes, Boiler).

Flue Shop Equipment.
Ryerson & Son, Joseph T.

Forges, Rivet Heating.
Ryerson & Son, Joseph T.

Forging Hammers.
Industrial Brownhoist Corp.

Forgings.
American Bridge Co.
American Steel Foundries.
Baldwin Locomotive Works, The.
Bethlehem Steel Co.

Brill Co., The J. G.
Carnegie Steel Co.
Edgewater Steel Co.
General Railway Signal Co.
Gould Coupler Co., The.
Illinois Steel Co.
Midvale Co., The.
Mt. Vernon Car Mfg. Co.
Neely Nut & Bolt Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Steel Car Forge Co.
Universal Draft Gear Attachment Co.

Forgings, Drop.
Baldwin Locomotive Works, The.
Brill Co., The J. G.
General Railway Signal Co.
Steel Car Forge Co.
Union Switch & Signal Co.

Forgings, Monel Metal.
International Nickel Co., The.

Foundry Supplies.
Bird-Archer Co., The.

Frames, Cast Steel Locomotive
General Steel Castings Corp.

Frames, Locomotive.
American Steel Foundries.
American Locomotive Co.
Baldwin Locomotive Works.
Birdsboro Steel Foundry & Machine Co.
Ohio Steel Foundry Co., The.
Union Steel Casting Co.

Frames, Truck.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works
Bettendorf Co., The.
Birdsboro Steel Foundry & Machine Co.
Buckeye Steel Castings Co.
Brill Co., The J. G.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Pressed Steel Car Co.
Pyle-National Co.
Symington Co., The.

Frames, Vanadium.
American Locomotive Co.
Baldwin Locomotive Works
Birdsboro Steel Foundry & Machine Co.
Union Steel Casting Co.

Frogs and Crossings.
Bethlehem Steel Co.
Ramapo Ajax Corp.

Fulcrums, Brake Beam.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
National Malleable & Steel Castings Co.

Furnaces, Electric.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Furnaces, Gasoline.
Railroad Supply Co.

Furnaces, Rivet Heating—(See Forges, Rivet Heating).

Furniture.
Aluminum Co. of America

Gage Testers—(See Testers, Gage).

Gages, Air.
Westinghouse Air Brake Co.

Gages, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Gages, Steam.
Ashton Valve Co.

Gages, Tire.
Schrader's Son, Inc., A.

Gages, Wheel Press Recording.
Ashton Valve Co.

Gaskets.
Westinghouse Air Brake Co.

Gasoline.
Ethyl Gasoline Corp.

Gear Blanks, Rolled Steel.
Edgewater Steel Co.
Standard Steel Works Co.

Gears and Pinions.
American Steel Foundries.
Westinghouse Elec. & Mfg. Co.

Gears, Silent.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gears, Valve — (See Valve Gears).

Generators, Acetylene.
Oxweld Railroad Service Co.

Generators, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Sunbeam Electric Mfg. Co
Westinghouse Elec. & Mfg Co.

Goggles, Welding.
Oxweld Railroad Service Co., The.
Sunbeam Electric Mfg. Co

Graders, Elevating.
Western Wheeled Scraper Co.

Grapples, Wood.
Industrial Brownhoist Corp.

Grate Bars.
Q & C Co., The.

Grate Shakers, Automatic.
Franklin Railway Supply Co., Inc.

Grates.
Firebar Corp.

Grease Forming Machines.
Franklin Railway Supply Co., Inc.

Grey Iron.
American Brake Shoe & Foundry Co.

Grinders, Internal.
Micro Machine Co.

Grinders, Portable Crank Pin.
Micro Machine Co.

Grinding Machines.
Sellers & Co., Inc., Wm.

Grinding Machines, Portable.
Ingersoll-Rand Co.
Ryerson & Son, Inc., Joseph T.

Guard Rails, Treated.
Curtin-Howe Corp.
International Creosoting & Construction Co.

Guard Rails, Foot Guard.
Q & C Co., The.

Guard Rails (One Piece).
Bethlehem Steel Co.
Ramapo Ajax Corp.

Guard Switch Point.
Q & C Co., The.

Guards, Cattle.
American Bridge Co.

Guards, Dust.
Gould Coupler Co., The.
Symington Co., The.

Hair Felt.
Johns-Manville Corp.

Hammers, Pneumatic.
Ingersoll-Rand Co.

Hammers, Riveting.
Ingersoll-Rand Co.

Hammers, Steam.
Industrial Brownhoist Corp.
Sellers & Co., Inc., Wm.

Hand Brakes—(See Brakes, Hand).

Hangers, Ball Bearing.
S. K. F. Industries, Inc.

Hand Rails & Fittings.
Aluminum Co. of America.

Hangers, Bottom Rod Safety.
Chicago Railway Equipment Co.

Hangers, Car Door—(See Fixtures, Car Door).

Headgates, Sliding
Armco Culvert Manufacturers Association

Headlight Repair Parts, Electric.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Headlights, Electric.
General Electric Co.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.
Westinghouse Electric & Mfg. Co.

Headlights, Reflectors & Cases.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Heaters, Electric.
Gold Car Heating & Lighting Co.
Westinghouse Electric & Mfg. Co.

Heaters, Feedwater.
Graver Tank & Mfg. Corp.

Heaters, Feedwater Locomotive.
Coffin Co., Jr., The J. S.
Superheater Company, The.
Worthington Pump & Machinery Corp.

Heaters, Feed Water, Stationary.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Heating & Ventilating Apparatus.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Westinghouse Electric & Mfg. Co.

Heating Equipment, Car.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

Heating Systems, Car (Electric and Steam).
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

High Temperature Cements.
Carey & Co., Philip, The.

Highway Crossing Protection Devices.
American Bridge Co.
Franklin Railway Supply Co., Inc.
Griswold Signal Co.
Railroad Supply Co.

Hoists, Chain.
Milwaukee Electric Crane & Hoist Corp.
Ryerson & Son, Jos. T.

Hoists, Electric.
Milwaukee Electric Crane & Hoist Corp.

Hoists, Pneumatic.
Ingersoll-Rand Co.

Hoisting Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Hooks, Wrecking.
National Malleable & Steel Castings Co.

Horns, Pneuphonic.
Westinghouse Air Brake Co.

Hose, Air, Steam, Etc.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Hose, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Hose, Tender.
Westinghouse Air Brake Co.

Incandescent Lamps.
General Electric Supply Corp.

Indicators, Speed & Cut-off.
Valve Pilot Co.

Ingots.
Birdsboro Steel Foundry & Machine Co.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
McConway & Torley Co.
Standard Steel Works Co.

Injectors, Exhaust Steam.
Sellers & Co., Inc., Wm.
Superheater Co., The.

Inspection of Material and Equipment—(See Engineers, Inspection).

Insulated Wire.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Insulation, Car.
Carey Co., Philip, The.
Wood Conversion Co.

Insulation, Car, Bldg.
Carey Co., Philip, The.
Johns Manville Corp.
Lehon Co., The.
Tuco Products Corp.
Union Asbestos & Rubber Co.
Wood Conversion Co.

Insulation, Electrical.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulation, Exhaust & Heater Pipe.
Carey Co., Philip, The.
Johns-Manville Corp.
Tuco Products Corp.
Union Asbestos & Rubber Co.

Insulation, Heat.
Carey Co., Philip, The.
Miner, W. H.

Insulation Tape.
General Electric Supply Corp.

Insulators, Electrical, Porcelain.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Interlocking Plant Equipment.
General Railway Signal Co.
Union Switch & Signal Co.

Iron Chain.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Charcoal.
Bethlehem Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Engine Bolt.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Forging Billets.
Lockhart Iron & Steel Co.

Iron, Hollow Staybolt.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Hollow Staybolt Bars.
Bethlehem Steel Co.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Pig.
Bethlehem Steel Co.

Iron, Refined.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Iron, Staybolt — (See also Staybolts).
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co
Ryerson & Son, Joseph T.

Jacking, Locomotive.
Carey Co., Philip, The.

Jacking Method of Installing Pipe
Armco Culvert Manufacturers Association

Jacks, Smoke.
Carey Co., Philip, The.
Johns Manville Corp.

Joints, Air Reservoir.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Blow Off Line (Roundhouse).
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Coach and Coach Yard.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Flexible.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Flexible Ball.
Barco Mfg. Co.

Joints, Rail.
American Steel Foundries.
Carnegie Steel Co.
Illinois Steel Co.
Q & C Co., The.
Rail Joint Co.
Union Switch & Signal Co.

Joints, Steam, Air & Liquid.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Swing.
Barco Mfg. Co.
Vapor Car Heating Co., Inc.

Journal Boxes and Lids.
Allegheny Steel Co.
American Steel Foundries.
Brill Co., The J. G.
Gould Coupler Co., The.
Hunt-Spiller Mfg. Corp.
National Malleable & Steel Castings Co.
Pullman Car & Mfg. Corp.
Railway Steel Spring Co.
Symington Co., The.
Union Spring & Mfg. Co.

Journal Oilers, Car & Locomotive.
Afdco Mfg. Co.

Keys, Brake Shoe.
Bradford Corporation.
Buffalo Brake Beam Co.
Mt. Vernon Car Mfg. Co.
Steel Car Forge Co.
Union Spring & Mfg. Co.

Knuckles, Emergency.
Q & C Co., The.

Laboratories, Testing.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Lacquers.
General Electric Supply Corp.
Sherwin-Williams Co.

Ladders, Steel Car.
Wine Railway Appliance Co.

Lagging, Locomotive.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lamps, Incandescent.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Inspector's.
Oxweld Railroad Service Co., The.

Lath, Metal
Armco Railroad Sales Co.

Lathes, Axle.
Sellers & Co., Inc., Wm.

Lathes, Engine.
Ryerson & Son, Joseph T.

Lathes, Wheel.
Sellers & Co., Inc., Wm.

Lead, White.
National Lead Co.

Lighting Equipment, Car.
Electric Storage Battery Co.

Lighting Fixtures and Systems.
General Electric Supply Corp.
Graybar Electric Co.
Pyle-National Co.

Lighting Plants, Gas, Electric
Pyle-National Co., The.
Sunbeam Electric Mfg. Co

Lightning Arresters.
General Electric Supply Corp.

Line Material.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lock Nuts—(See Nut Locks)

Locomotive Jacket Sheets.
Armco Railroad Sales Co.

Locomotive Water Conditioners
Bird-Archer Co., The.

Locomotives, Contractors.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Electric.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Locomotives, Gasoline.
Baldwin Locomotive Works.

Locomotives, Gas-Electric.
Brill Co., The J. G.
Electro-Motive Co.

Locomotives, Geared.
Lima Locomotive Works.

Locomotives, Industrial.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Mine.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Oil Engine, Electric Driven.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.
Whitcomb Co., Geo. D. The.

Locomotives, Rebuilt.
American Locomotive Co.

Locomotives, Repair Parts.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Steam.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotive Stokers.
Standard Stoker Co.

Locomotive Valve Pilot.
Valve Pilot Co.

Lubricators, Driving Box.
Franklin Railway Supply Co., Inc.

Lubricators, Piston Rod.
Q & C Co., The.

Lumber, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lumber, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Industrial Lumber & Creosoting Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Machinery, Hydraulic.
Birdsboro Steel Foundry & Mach. Co.

Machine Screws, Monel Metal
International Nickel Co., The.

Magnets, Lifting.
Industrial Brownhoist Corp.
Electro Metallurgical Sales Corp.

Mechanical Draft Apparatus—(See Heating and Vent. App.).

Mechanical Stokers.
Standard Stoker Co.

Melters, Snow, Electric.
Q & C Co., The.

Metallic Flexible Conduit.
General Electric Supply Corp.

Meters, Water & Oil.
Worthington Pump & Machinery Corp.

Milling Machines, Planer Type.
Sellers & Co., Inc., Wm.

Milling Machines, Plain and Universal.
Ryerson & Son, Joseph T.

Milling Machines, Portable Frame Jaw.
Micro Machine Co.

Mohair Upholstery Velvets.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Molybdenum Metal.
Vanadium Corp. of America.

Monel Metal, Rods, Sheets, Tubes, Wire, etc.
International Nickel Co., The.

Motors, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Motors & Generators.
Fairbanks-Morse & Co.

Moulding.
Aluminum Co. of America

Multiple V Belt Drives.
Worthington Pump & Machinery Corp.

Nails.
American Steel & Wire Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Nipples, Air Hose.
Prime Manufacturing Co.

Nozzles, Exhaust.
Franklin Railway Supply Co., Inc.

Nozzles, Oxy-Acetylene Cutting.
Oxweld Railroad Service Co., The.

Nuts—(See Bolts and Nuts).

Nut Locks.
Dardelet Threadlock Corp.
Grip Nut Co.

Nuts, Tank Hose.
Prime Manufacturing Co., The.

Office Appliances.
Remington-Rand Business Service.

Oils, Diesel Engine
Vacuum Oil Co.

Oil, Dynamo
Vacuum Oil Co.

Oil-Electric Locomotives.
American Locomotive Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Oil Filtering & Storage Systems.
Graver Tank & Mfg. Corp

Oils & Greases, Engine
Vacuum Oil Co.

Oils & Greases, Lubricating
Vacuum Oil Co.

Oils & Greases, Motor
Vacuum Oil Co.

Oil, Linseed.
National Lead Co.

Oils, Locomotive Valve
Vacuum Oil Co.

Oil Plugs, Steam Chest.
Franklin Railway Supply Co., Inc.

Oil, Turbine
Vacuum Oil Co.

Oxy-Acetylene Apparatus.
Oxweld Railroad Service Co., The.

Oxygen.
Oxweld Railroad Service Co., The.

Packing.
Westinghouse Air Brake Co.

Packing, Air Pump.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.

Packing, Asbestos.

Packing, Cylinder and Valve Ring.
Johns-Manville Corp.
Hunt-Spiller Mfg. Corp.
Locomotive Finished Material Co.
Westinghouse Air Brake Co.

Packing, Locomotive Cab Cock.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing, Ring Boiler.
Union Asbestos & Rubber Co.

Packing, Semi-Metallic.
Pilot Packing Co.
Central Alloy Steel Corp.

Packing, Sheet.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing, Soft.
Carey & Co., Philip, The.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.

Packing, Throttle.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Paint Burners, Acetylene.
Oxweld Railroad Service Co., The.

Paint, Metal Protective.
Lowe Bros. Co., The.
National Lead Co.
Sherwin-Williams Co.

Paint, Powder.
Aluminum Co. of America

Paint Spraying Equipment.
De Vilbiss Mfg Co., The.

Paints.
Lowe Bros. Co., The.
National Lead Co.
Sherwin-Williams Co.

Paper, Carbon.
Remington-Rand Business Service.

Paper, Sheathing.
Carey & Co., Philip, The.

Patterns, for Iron, Steel & Brass Castings.
Baldwin Locomotive Works, The.

Pavement Breakers.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Pickling Equipment, Monel Metal.
International Nickel Co., The.

Pile Drivers.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co

Piling, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Piling, Sheet Steel.
American Bridge Co.
Carnegie Steel Co.
Inland Steel Company

Pilot Beams, Cast Steel.
General Steel Castings Corp.
Gould Coupler Co., The.

Pilots, Cast Steel.
General Steel Castings Corp.
Locomotive Finished Material Co.

Pins, Air Brake & Clevis.
Champion Rivet Co.

Pins, Center.
Miner, W. H.

Pins, Coupler Knuckle.
Champion Rivet Co.
McConway & Torley Co.
National Malleable & Steel Castings Co.

Pins, Crank.
American Locomotive Co.
Baldwin Locomotive Works.
Miner, Inc., W. H.
Standard Steel Works Co
Union Asbestos & Rubber Corp.

Pipe, Corrugated Iron
Armco Culvert Manufacturers Association

Pipe, Paved Invert
Armco Culvert Manufacturers Association

Pipe Coverings.
Carey & Co., Philip, The.
Johns-Manville Corp.
Keasby & Mattison Co.

Pipe Fittings—(See Fittings, Pipe).

Pipe, Metal Culvert.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Republic Steel Corp.

Pipe, Perforated Iron
Armco Culvert Manufacturers Association

Pipe, Spiral Welded.
Armco Railroad Sales Co

Pipe, Steel Signal.
National Tube Co.

Pipe, Spiral Welded.
Armco Railroad Sales Co.

Pipe, Wrought Iron.
Byers Co., A. M.
Reading Iron Co.

Planers, Plate.
Ryerson & Son, Jos. T.
Sellers & Co., Inc., Wm.

Plates.
Steel Car Forge Co.

Plates, Follower.
Steel Car Forge Co.

Plates, Boiler, Firebox—(See Steel Firebox).

Plates, Center—(See Bearings, Center).

Plates, Iron & Steel.
Armco Railroad Sales Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Plate & Sheet Metal Work.
Baldwin Locomotive Works, The.

Plates, Tie.
Illinois Steel Co.
Inland Steel Company.
Railroad Supply Co.
Tennessee Coal, Iron & Railroad Co.

Plates, Tin and Terne.
American Sheet & Tin Plate Co.

Platforms, Car.
Gould Coupler Co., The.
Standard Coupler Co.

Platforms, Cast Steel, Passenger Car.
General Steel Castings Corp.

Plows, Railroad and Grading.
Western Wheeled Scraper Co.

Plows, Snow.
American Locomotive Co.
Brill Co., The J. G.
Q & C Co., The.

Plush, Mohair.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Pneumatic Tools.
Ingersoll-Rand Co.

Poles, Signal.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
General Railway Signal Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Union Switch & Signal Co.

Poles, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
General Electric Supply Corp.
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Poles, Steel Tubular.
Graybar Electric Co.
National Tube Co.

Posts, Fence, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Inland Steel Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Posts, Steel Fence.
American Steel & Wire Co.
Q & C Co., The.

Powder, Blasting—(See Explosives).

Powdered Coal Equipment.
Muhlfeld, John E.

Power Plants.
General Electric Co.
Muhlfeld, John E.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Power Transmission Supplies.
Sellers & Co., Inc., Wm.

Preservatives, Wood.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Presses, Flanging Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Presses, Hydraulic.
Baldwin-Southwark Corp.
Birdsboro Steel Foundry & Machine Co

Presses, Wheel.
Birdsboro Steel Foundry & Machine Co.
Sellers & Co., Inc., Wm.

Pulverizers, Coal — (See Crushers, Coal).

Pumping Stations.
Fairbanks-Morse & Co.

Pump Liners, Monel Metal.
International Nickel Co., The.

Pump Rods, Monel Metal.
International Nickel Co., The.

Pump Shafts, Monel Metal.
International Nickel Co., The.

Pumps, Hydraulic.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Pumps & Pumping Mchy.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Pumps, Vacuum.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Punching and Shearing Machines.
Ryerson & Son, Joseph T

Pushers, Coal.
Standard Stoker Co.

Pyrometers, Superheated Steam.
Superheater Co., The.

Rail Anchors.
Bethlehem Steel Co.
P. & M. Co., The.

Rail-Bonds.
American Steel & Wire Co.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg Co.

Rail Braces — (See Braces, Rail).

Rail Reclamation Equipment.
Ryerson & Son, Joseph T

Railroad Shops.
United Engineers & Constructors, Inc.

Rail Splice Plates — (See Joints, Rail).

Railroad Structures — (See Engineers and Contractors; also Building).

Rails.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.
Tennessee Coal, Iron & Railroad Co.
Thomson Rail Corp.

Railway Signals.
General Electric Supply Corp.

Rattan.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Receivers, Air.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.

Recorders, Speed & Cut-off.
Valve Pilot Co.

Rectifiers for Signal Work.
General Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.

Reducing Valves.
Vapor Car Heating Co., Inc.

Reflectors, Headlight.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.

Refrigerators.
Wine Railway Appliance Co.

Regulators, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Relays.
General Railway Signal Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co

Removers, Paint & Varnish.
Oakite Products, Inc.

Repair Parts, Stoker.
Standard Stoker Co.
Q & C Company, The.

Retorts, Creosoting.
Graver Tank & Mfg. Corp.

Reverse Gear, Power.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Ringers, Bell.
Hammett, H. G.

Rivet Cutters.
Ingersoll-Rand Co.

Riveters, Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Riveting Machines.
Ingersoll-Rand Co.

Rivets.
Inland Steel Co.
Neely Nut & Bolt Co.
Ryerson & Son, Joseph T.
Pressed Steel Car Co.
Russell, Burdsall & Ward Bolt and Nut Co.

Rods.
Neely Nut & Bolt Co.

Rolled Steel.
Carnegie Steel Co.

Roller Bearings—(See Bearings, Roller).

Rolls, Bending & Straightening.
Birdsboro Steel Foundry & Machine Co.

Roof Slabs, Concrete.
Federal American Cement Tile Co.

Roofing, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.
Lehon Co., The.

Roofing, Buildings.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Lehon Co., The.
Johns-Manville Corp.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).

Roofing, Car.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey & Co., Philip, The.
Hutchins Car Rfg. Co.
Johns-Manville Corp.
Lehon Co., The.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).
Tuco Products Corp.
Union Metal Products Co.

Roofing, Corrugated.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey Co., Philip, The.
Johns-Manville Corp.

Roofing, Tile.
Federal American Cement Tile Co.

Roofing, Tile, Cement.
Federal American Cement Tile Co.

Roofing, Tin.
American Sheet & Tin Plate Co.

Rope, Wire — (See Wire Rope).

Rust Preventatives.
Dearborn Chemical Co.
Oakite Products, Inc.

Safe Ends.
National Tube Co.

Sand Drying Plants.
Roberts & Schaefer Co.

Sanitary Products.
West Disinfecting Co.

Sash Balances.
Tuco Products Co.

Saws, Circular Metal.
Ryerson & Son, Joseph T.

Saws, High Speed, Friction.
Ryerson & Son, Joseph T.

Saws, Portable Rail.
Industrial Brownhoist Corp.
Q & C Co., The.

Scales.
Fairbanks-Morse & Co.

Scrapers, Wheeled and Drag.
Western Wheeled Scraper Co.

Screens, Passenger Car.
Tuco Products Corp.

Seats, Car.
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Seats, Coach.
Brill Co., The J. G.

Shafting.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.
Standard Steel Works Co.

Shapers.
Ryerson & Son, Joseph T.

Shapes, Pressed Steel.
Pressed Steel Car Co.
Sellers & Co., Inc., Wm.

Shapes, Structural.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheets, Blue Annealed.
Allegheny Steel Co.

Sheets, Building, Special Car, Corrugated & Plain.
Armco Railroad Sales Co.

Sheets, Corrugated.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Carnegie Steel Co.
Johns-Manville Corp.
Ryerson & Son, Joseph T.

Sheets, Corrugated & Plain.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheets, Electrical.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Iron & Steel.
Armco Railroad Sales Co.
Bethlehem Steel Co.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).

Sheets, Locomotive Jacket.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.

Sheets, Polished or Planished Iron.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.

Sheets, Steel.
Armco Railroad Sales Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sherardising Plants.
General Electric Co.

Shop Calling Systems—(See Systems, Communication).

Shops, Railroad—(See Buildings, Iron, Steel and Steel Concrete).

Shovels & Draglines.
Industrial Brownhoist Corp.

Shovels, Steam, Gasoline & Electric.
Orton Crane & Shovel Co.

Siding, Iron & Steel.
Armco Railroad Sales Co.

Siding., Bldg., Car, Corrugated & Plain.
Kinnear Mfg. Co.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.

Siding, Corrugated & Plain.
Carey & Co., Philip, The.
Johns-Manville Corp.

Signal Accessories.
Electric Storage Battery Co.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Signals, Automatic Cab.
General Railway Signal Co.
Union Switch & Signal Co.

Signal Blades.
General Railway Signal Co.
Union Switch & Signal Co.

Signals, Crossing.
Union Switch & Signal Co.

Signals, Crossing Protection.
General Railway Signal Co.
Railroad Supply Co.

Signals, Railway.
General Electric Co.
Union Switch & Signal Co.

Sign Posts, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Signs, Highway Crossing.
Railroad Supply Co.

Silico Manganese.
Vanadium Corp. of America.

Slabs, Concrete Floor.
Federal Cement Tile Co.

Slag, Blast Furnace.
Carnegie Steel Co.

Slotting Machines.
Sellers & Co., Inc., Wm.

Slotting Machines, Locomotive Cylinder.
American Steel & Wire Co.

Sludge Removers.
Bird-Archer Co., The.

Soap, Liquid.
West Disinfecting Co.

Solder.
National Bearing Metals Corp.
Ryerson & Son, Inc., Joseph T.
Westinghouse Elec. & Mfg. Co.

Spark Arresters.
Locomotive Firebox Co.

Speed Indicators & Recorders.
Valve Pilot Corp.

Spelter—(See Zinc).

Spikes.
American Steel & Wire Co.
Bethlehem Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Splice Bars, Angle.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.

Spring Plates or Seats.
Allegheny Steel Co.
National Malleable & Steel Castings Co.
Union Spring & Mfg. Co.

Springs.
American Steel Foundries Co.
American Steel & Wire Co.
Baldwin Locomotive Works The.
Pittsburgh Spring & Steel Co.
Railway Steel Spring Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Switch & Signal Co.

Springs, Shop Equipment.
Ryerson & Son, Joseph T.

Springs, Vanadium Steel.
Pittsburgh Spring & Steel Co.
Union Spring & Mfg. Co.

Stacks, Steel.
American Bridge Co.
Graver Tank & Mfg. Corp.

Stands, Switch & Target.
Q & C Co., The.

Staybolts.
American Locomotive Co.
Ewald Iron Co.
Ryerson & Son, Joseph T.

Staybolts, Hollow.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Steam Chests.
Franklin Railway Supply Co., Inc.

Steam Enclosures, Corrugated Iron.
Republic Steel Corp.

Steam Shovels.
Orton Crane & Shovel Co.

Steel Alloy.
Illinois Steel Co.
Ryerson & Son, Joseph T.
Republic Steel Corp.
Standard Steel Works Co.

Steel, Firebox.
Carnegie Steel Co.
Illinois Steel Co.

Steel & Iron, Stainless.
Allegheny Steel Co.

Steel, Open Hearth.
Carnegie Steel Co.
Illinois Steel Co.

Steel Plate Construction.
Graver Tank & Mfg. Corp.

Steel, Pressed Specialties.
Hale-Kilburn Co.

Steel, Structural.
American Bridge Co.
Carnegie Steel Co.
Graver Tank & Mfg. Corp.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Steel, Tool.
Illinois Steel Co.
Midvale Co., The.
Q & C Co., The.
Ryerson & Son, Joseph T.

Step Joints.
Q & C Co., The.
Rail Joint Co.

Steps, Car—(See Car Steps, Safety)

Stokers, Locomotive.
Lower Stoker Co.
Standard Stoker Co.

Stokers, Mechanical.
Westinghouse Elec. & Mfg. Co.

Stoker Repair Parts.
Lower Stoker Co.
Standard Stoker Co.

Storm Sewers, Corrugated Iron.
Republic Steel Corp.

Strainer, Air.
Westinghouse Air Brake Co.

Strainers, Tank Hose.
Prime Mfg. Co., The.

Stringers, Bridge, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Structural Shapes, Rolled Shapes.
Carnegie Steel Co.

Superheaters.
Superheater Co., The.

Supports, Bottom Rod Safety.
Chicago Railway Equipment Co.

Switch Boards.
Graybar Electric Co.
Johns-Manville Corp.
Westinghouse Elec. & Mfg. Co.

Switch Machines.
General Railway Signal Co.

Switch Movements.
Union Switch & Signal Co.

Switch Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Switches, Electric.
Electric Service Supplies Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Switches & Switch Stands.
Ramapo Ajax Corp.

Syphons, Corrugated Iron.
Republic Steel Corp.

Syphons, Locomotive.
Locomotive Firebox Co.

Syphons, Locomotive, Boilers
Locomotive Firebox Co.

Tables, Welding.
Oxweld Railroad Service Co., The.

Tables, Welding.
Oxweld Railroad Service Co., The.

Tamping Machines, Tie.
Ingersoll-Rand Co.

Tamping Outfits, Tie.
Ingersoll-Rand Co.

Tank Cars.
General American Tank Car Corp., The.

Tanks, Acetylene, Gas.
Oxweld Railroad Service Co., The.

Tanks, Air, Gas, Oil and Water.
Baldwin Locomotive Works, The.
Graver Tank & Mfg. Corp.

Tanks, Water.
American Bridge Co.
American Locomotive Co.
National Tube Co.
Pressed Steel Car Co.
Westinghouse Air Brake Co.

Tape, Insulation.
Johns-Manville Corp.
Westinghouse Elec. & Mfg. Co.

Taps, Staybolt.
Ryerson & Son, Joseph T.

Tele. & Tele. Wire.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Terminals, Railroad.
United Engineers & Constructors, Inc.

Testers, Boiler.
Sellers & Co., Inc., Wm.

Testers, Gage.
Ashton Valve Co.

Testers, Rail.
Sperry Products, Inc.

Testers, Staybolt.
Flannery Bolt Co.

Testing Machines.
Baldwin-Southwark Corp.

Thermostats.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.

Tie Plates.
Bethlehem Steel Co.
Illinois Steel Co.
Inland Steel Company
Railroad Supply Co.

Ties, Creosoted.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Ties, Steel.
American Bridge Co.
Bethlehem Steel Co.
Carnegie Steel Co.

Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Tile, Cement, Concrete.
Federal American Cement Tile Co.

Timber, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber Co.
Southern Wood Preserving Co.
Wood Conversion Co.

Tires.
Firestone Tire & Rubber Co.
General Tire & Rubber Co.
Goodyear Tire & Rubber Co.
Goodrich Rubber Co., B. F.

Tires, Steel.
Edgewater Steel Co.
Midvale Co., The.
Railway Steel Spring Co.
Standard Steel Works Co.

Toilet Papers
U. S. Envelope Co.

Tools, High Speed Steel.
Bethlehem Steel Co.
Bird-Archer Co., The.

Towers, Floodlight.
Pyle-National Co.

Track Skates.
Q & C Co., The.

Tractors.
Caterpillar Tractor Co.
Elwell-Parker Electric Co.
Industrial Lumber Co.
International Creosoting & Construction Co.

Tractors, Industrial.
Elwell-Parker Electric Co.
International Harvester Co.

Tractors, Turntable.
Nichols & Bro., Geo. P.

Train Control Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Tramways, Wire Rope.
American Steel & Wire Co.

Transfer Tables.
American Bridge Co.
Industrial Brownhoist Corp.
Nichols & Bro., Geo. P.

Transformers.
General Electric Supply Corp.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Trap Doors.
Edwards Co., O. M.

Trap Doors & Fixtures.
Tuco Products Corp.

Traps, Steam.
Johns-Manville Corp.

Treads, Bridge Floor.
Carnegie Steel Co.

Treads, Safety.
Ryerson & Son, Joseph T.

Treatment Water—(See Water Softening and Purifying).

Truck Frames—(See Frames, Truck).

Trucks, Oxy-Acetylene Supply.
Oxweld Railroad Service Co., The.

Trucks, Car and Locomotive.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works.
Bettendorf Company, The.
Birdsboro Steel Foundry & Machine Co.
Brill Co., The J. G.
Flexible Truck Co.
Franklin Railway Supply Co., Inc.
Gould Coupler Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Standard Car Truck Co.
Symington Co., The.

Trucks, Cast Steel Tender.
General Steel Castings Corp.

Trucks, Cast Steel, Electric Car.
General Steel Castings Corp.

Trucks, Cast Steel, Car and Locomotive.
General Steel Castings Corp.

Trucks, Electric Storage Battery.
Elwell-Parker Electric Co.

Trucks, Industrial.
Elwell-Parker Electric Co.

Trucks, Motor.
Dodge Motor Truck Corp.
General Motors Truck Co.
International Harvester Co.
Reo Motor Car Co.
White Co., The.

Trucks, Tender.
Flexible Truck Co.

Trucks, Trailer.
Brill Co., The J. G.
Franklin Railway Supply Co., Inc.

Tubes, Arch.
National Tube Co.

Tubes, Boiler.
Allegheny Steel Co.
Armco Railroad Sales Co.
Bethlehem Steel Co.
Globe Steel Tubes Co.
National Tube Co.
Ryerson & Son, Joseph T.

Tubes, Boiler, Charcoal Iron.
Bethlehem Steel Co.
Reading Iron Co.

Tubes, Staybolt.
Falls Hollow Staybolt Co.

Tubes, Tire.
Firestone Tire & Rubber Co.
Goodyear Tire & Rubber Co.

Tubing.
Aluminum Co. of America.

Tubing, Seamless Steel.
National Tube Co.

Tungsten Metal.
Vanadium Corp. of America.

Turbo Generators.
Electric Service Supplies Co.
General Electric Co.
Pyle-National Co.
Sunbeam Electric Mfg Co.
Westinghouse Elec. & Mfg. Co.

Turnbuckles.
American Bridge Co.
American Steel & Wire Co.
Ryerson & Son, Joseph T.

Turntable Tractors.
Nichols & Bro., Geo. P.

Turntables.
American Bridge Co.
Industrial Brownhoist Corp.
Nichols & Bro., Geo. P.

Typewriter Ribbons.
Remington-Rand Business Service.

Typewriters.
Remington-Rand Business Service.

Uncoupling Device.
Hutchins Car Rfg. Co.

Undercrossings, Corrugated Iron.
Republic Steel Corp.

Underfloor Duct.
General Electric Supply Corp.

Underfloor Duct, Fibre and Metal.
Johns-Manville Corp.

Underframes, Cast Steel, Tender.
General Steel Castings Corp.

Underframes, Cast Steel, Freight Car.
General Steel Castings Corp.

Underframes, Steel.
Bettendorf Co., The.
Brill Co., The J. G.
Pressed Steel Car Co.
St. Louis Car Co.

Underground Conduit.
General Electric Supply Corp.

Upholstery, Car.
Brill Co., The J. G.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Valve Caps.
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Valve Gears, Locomotive.
Pyle-National Co.

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Westinghouse Air Brake Co.

Valves, Back Pressure Acetylene.
Oxweld Railroad Service Co., The.

Valves, Balanced Slide
Hammett, H. G.

Valves, Blow-Off.
Bird-Archer Co., The.

Valves, Check & Angle Steam
Sellers & Co., Inc., Wm.

Valves, Drifting.
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Sellers & Co., Inc., Wm.

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Valves, Piston.
Franklin Railway Supply Co., Inc.

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Ashton Valve Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Valves, Pressure Regulating.
Gold Car Heating & Lighting Co.

Valves, Throttle.
American Throttle Co., Inc.
Bradford Corporation.

Valves, Fire.
Schrader's Son, Inc., A.

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Aluminum Co. of America.

Varnishes.
General Electric Supply Corp.
Lowe Bros. Co., The
Sherwin-Williams Co.
Vapor Car Heating Co., Inc.
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Gold Car Heating & Lighting Co.

Ventilators, Shop & Roundhouse.
Carey Co., Philip, The.
Johns-Manville Corp.

Wardrobes, Rolling and Disappearing Front — (See Lockers).

Washers.
National Malleable & Steel Castings Co.
Ryerson & Son, Joseph T.
Wine Railway Appliance Co.

Washers, Boiler.
Sellers & Co., Inc., Wm.

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Johns-Manville Corp.
Lehon Co., The.

Water Purifying Materials & Compounds.
Bird-Archer Co., The.
Dearborn Chemical Co.

Water Softening & Purifying.
Bird-Archer Co., The.
Dearborn Chemical Co.
Graver Tank & Mfg. Corp.
Permutit Co., The.

Weather Stripping.
Tuco Products Corp.

Wedges, Automatic.
Franklin Railway Supply Co., Inc.

Wedges, Journal Box.
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Gould Coupler Co.
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Symington Co., The.

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Electric Railweld Service Corp.

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Welding Supplies.
General Electric Co.
Oxweld Railroad Service Co., The.

Welding and Cutting Apparatus—(See Cutting and Welding Apparatus).

Well Casings, Corrugated Iron.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Wheel Centers, Driving.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works, The.
Birdsboro Steel Foundry & Machine Co.
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Oxweld Railroad Service Co., The.

Wiring Appliances.
Pyle-National Co.

Wood, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Wood Preservative — (See Preservative, Wood).

Wood, Preservative Treatment (Zinc Meter Arsenic).
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Wrecking Cranes — (See Cranes, Wrecking).

Z M A Wood Preservative (Zinc Metal Arsenite).
Curtin-Howe Corp.

Index To Advertisers

A

Allegheny Steel Co. 43
American Arch Co., Inc., The 26
American Brake Shoe & Foundry Co. 43
American Bridge Co. 40
American Locomotive Co. ... 27
American Sheet & Tin Plate Co. 7
Armco Railroad Sales Co. ... 13
Ashton Valve Co. 42
Associated Business Papers, Inc. 12

B

Baldwin Locomotive Works, The 8
Battey & Kipp, Inc. 44
Bethlehem Steel Corp. 10
Bird-Archer Co., The 40
Bixby, Inc., R. W. 44
Buffalo Brake Beam Co. 43
Burroughs Adding Machine Co. 11
Buyers' Index ..... 45 to 51 incl.

C

Camel Co. 41
Cardwell-Westinghouse Co. . 16
Carey Co., The, Philip. ... 14
Classified Advertisements ... 44
Coffin Co., The, J. S., Jr. ... 36

E

Edgewater Steel Co. 54

F

Falls Hollow Staybolt Co. ... 43
Firebar Corporation 30
Franklin Railway Supply Co., Inc. 23

G

Get Together Department .. 44
Gulick-Henderson Co. 44

H

Hammett, H. G. 43
Harbison-Walker Refractories Co. 26
Hunt Co., Robert W. 44
Hunt-Spiller Mfg. Corp. 32
Hutchins Car Roofing Co. . 22
Hyman-Michaels Co. 44

I

Illinois Steel Co. 28
International Creosoting & Construction Co. 2
Iron & Steel Products, Inc. 38

K

Kerite Insulated Wire & Cable Co., The 39

L

Lima Locomotive Works, Inc. 24, 25
Lockhart Iron & Steel Co. .. 35
Locomotive Finished Materials Co. 42
Lowe Bros. Co. 42
Lower Stoker Co. 39

M

Magnus Co. 40
Mi-er, Inc., W. H. 3
Mt. Vernon Car Co. 41
Muhlfeld, John E. 44

N

National Lead Co., The 6
National Tube Co. 29
Nichols & Bro., J. P. 43

O

Ohio Locomotive Crane Co. 41
Orton Crane & Shovel Co. .. 42

P

P. & M. Co., The 43
Pittsburgh Testing Laboratory 44
Professional Directory 44

R

Railroad Supply Co., The .. 43
Railway Educational Bureau, The 44
Remington Rand Business Service, Inc. 38
Republic Steel Corp. 31
Ryerson & Son, Inc., Jos. T. 43

S

Schaefer Equipment Co. 15
Simmons-Boardman Publishing Co. 53
Southern Wood Preserving Co. 39
S K F Industries, Inc. 17
Standard Car Truck Co. 42
Standard Steel Works Co. .. 19
Standard Stoker Co., The .. 37
Stucki Co., A. 43
Superheater Co., The 34
Superior Sheet Steel Co., The 38

T

Timken Roller Bearing Co., The 20, 21
Tuco Products Corp. 43

U

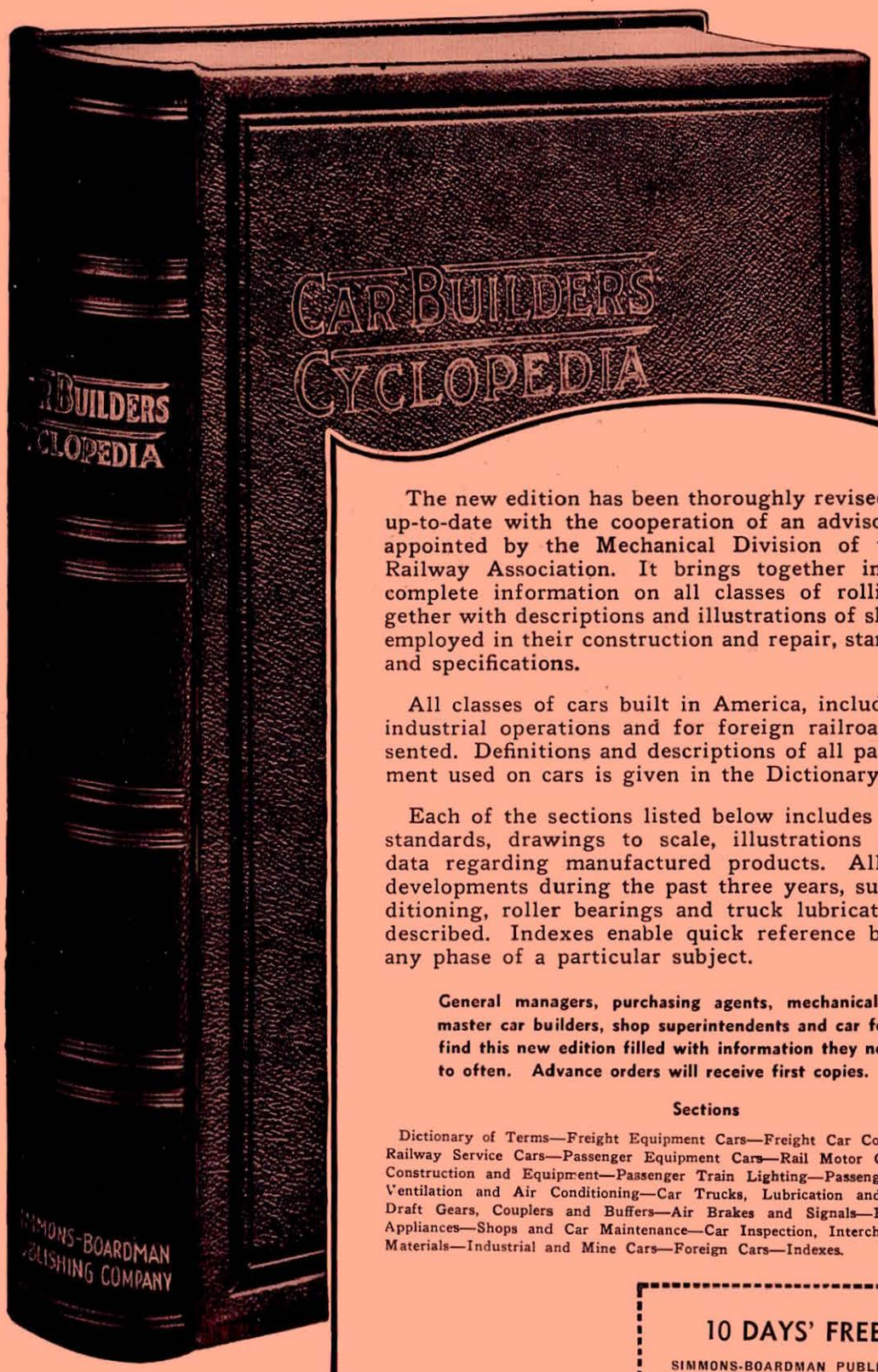
Union Asbestos & Rubber Co. 43
Union Metal Products Co. .. 18
Union Spring & Mfg. Co. .. 43
Union Steel Casting Co. 43

V

Vacuum Oil Co. 4

W

West Disinfecting Co. 41
Western Wheeled Scraper Co. 43
Westinghouse Air Brake Co. 33
Westinghouse Elec. & Mfg. Co. 9
Wheel Truing Brake Shoe Co. 41
Wine Railway Appliance Co., The 43



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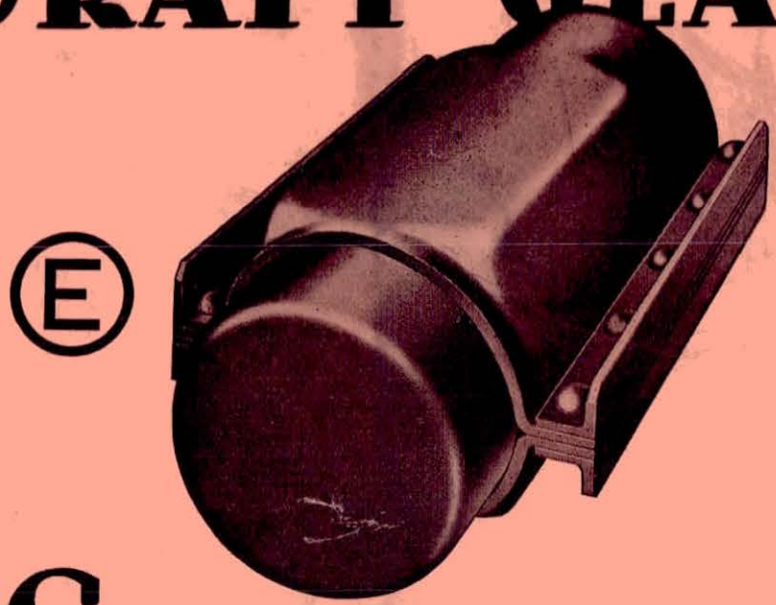

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